

# Mental Health Series

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## Base Panel Construction - ZCTA-Week Level

### Hospital Data - ZCTA-Week level

```
hosp_zcta <- read_csv("Data/Restricted MHA Data/minnepop_1620_agg_zipfull_MH_102222.csv") %>%
  arrange(zipcode, year, weekofyr) %>%
  select(-c(`_chk`, zippop_tag)) %>%
  filter(!(year==2016 & weekofyr==53)) %>%
  mutate(across(-c(zipcode, year, weekofyr),
    ~ifelse(is.na(.x), 0, .x))) #fill NAs with 0

#chronic/nonchronic indicators
hosp_zcta_new <- read_csv("Data/Restricted MHA Data/minnepop_1620_agg_zipfull_MH_7_28_23.csv") %>%
  arrange(zipcode, year, weekofyr) %>%
  select(-c(`_chk`, zippop_tag)) %>%
  filter(!(year==2016 & weekofyr==53)) %>%
  mutate(across(-c(zipcode, year, weekofyr),
    ~ifelse(is.na(.x), 0, .x))) %>% #fill NAs with 0
  select(zipcode, year, weekofyr,
    acute_tot, chronic_tot,
    black_acute_tot, black_chronic_tot,
    white_acute_tot, white_chronic_tot,
    latin_acute_tot, latin_chronic_tot)

hosp_zcta <- hosp_zcta %>%
  left_join(hosp_zcta_new, by = c("zipcode", "year", "weekofyr"))
```

### ZCTAs and ACS 5-Year Estimates

```
#adding in 5-year ACS data
census_api_key("ecda17575f4d914b502c70f2bae7a5f3d253792d")

year <- lst(2016, 2017, 2018, 2019, 2020)

acs <- map_dfr(
  year,
  ~ get_acs(geography = "zcta",
    variables = c("B01001_001E", "B03003_003E",
      "B02001_003E", "B02001_002E",
      "B02001_004E", "B02001_008E",
      "B02001_005E", "B02001_006E",
      "B02001_007E", "B11001_003E",
      "B17001_002E", "B01002_001E",
      "B09010_002E", "B06009_005E",
      "B01001_002E", "B99233_005E",
      "B23025_005E",
      "B19057_002E",
      "B11003_015E",
```

```

    "B06009_002E",
    "B25003_002E",
    "B05002_013E",
    "B19013_001E",
    "B23025_002E",
    "B07001_017E"),
    output = "wide",
    survey = "acs5",
    year = .x), .id = "year") %>%
rename(total_pop = B01001_001E,
       white_pop = B02001_002E,
       black_pop = B02001_003E,
       na_pop = B02001_004E,
       asian_pop = B02001_005E,
       hpi_pop = B02001_006E,
       other_pop = B02001_007E,
       biracial_pop = B02001_008E,
       hisp_pop = B03003_003E,
       ssi_snap = B09010_002E, #snap, ssi, public cash transfers
       med_age = B01002_001E,
       mar_fam = B11001_003E,
       povlevel = B17001_002E,
       bach_degree = B06009_005E,
       male = B01001_002E,
       nowork_12 = B99233_005E,
       total_ilf = B23025_002E,
       unemp = B23025_005E,
       pub_assist = B19057_002E,
       female_hh = B11003_015E,
       no_hs_dip = B06009_002E,
       res_mob = B07001_017E,
       own_hh = B25003_002E,
       foreign = B05002_013E,
       med_hh_inc = B19013_001E) %>%
select(-ends_with("M", ignore.case = F), -GEOID) %>%
mutate(zcta = str_sub(NAME, 6),
       unemp_rate = 100*unemp/total_ilf,
       pov_rate = 100*povlevel/total_pop,
       pub_assist_rate = 100*pub_assist/total_pop,
       female_hh_rate = 100*female_hh/total_pop,
       no_hs_dip_rate = 100*no_hs_dip/total_pop,
       bach_degree_rate = 100*bach_degree/total_pop,
       res_mob_rate = 100-100*res_mob/total_pop,
       own_hh_rate = 100*own_hh/total_pop,
       foreign_rate = 100*foreign/total_pop) %>%
select(-NAME) %>%
select(zcta, everything()) %>%
mutate(year = as.numeric(year),
       zcta = as.numeric(zcta))

#joining to hospital data
hosp_panel <- hosp_zcta %>%
  left_join(acs, by = c("zipcode"="zcta", "year"))

#SF geometries - get all ZCTAs
zcta <- get_acs(geography = "zcta",
               variables = "B01001_001",
               output = "wide",
               year = 2020, #change back to 2020
               geometry = T,
               survey = "acs5") %>%

```

```

rename(zcta = GEOID,
      pop_2020 = B01001_001E) %>%
select(-c(NAME, B01001_001M, pop_2020)) %>%
mutate(zcta = as.numeric(zcta))

## |

#minneapolis shapefile (source: openminneapolis.gov)
mpls <- st_read("Data/mpls_city-shp/16cbbbfa-ad10-493c-afaf-52b61f2e76e42020329-1-180h9ap.whbo.shp") %>%
  st_set_crs(st_crs(zcta))

## Reading layer `16cbbbfa-ad10-493c-afaf-52b61f2e76e42020329-1-180h9ap.whbo' from data source `C:\Users\rlarson
## using driver `ESRI Shapefile'
## Simple feature collection with 1 feature and 4 fields
## Geometry type: POLYGON
## Dimension: XY
## Bounding box: xmin: -93.32911 ymin: 44.89059 xmax: -93.19433 ymax: 45.05125
## Geodetic CRS: WGS 84

#zctas that intersect MPLS
zcta_intersect <- zcta %>%
  st_filter(mpls, .predicate = st_intersects) %>%
  mutate(zcta_area = as.numeric(st_area(.)),
        zcta_area_sqkm = zcta_area*.000001,
        zcta_area_sqmi = zcta_area_sqkm*.386102,
        intersection_area = as.numeric(st_area(st_intersection(., mpls))),
        perc_intersection = round(intersection_area/zcta_area*100,2)) %>%
  filter(perc_intersection >= 5)

#filter hospital panel
panel <- hosp_panel %>%
  filter(zipcode %in% zcta_intersect$zcta) %>%
  mutate(zcta = zipcode)

#creating date bookends
panel <- panel %>%
  group_by(zipcode, year) %>%
  mutate(begin_date = ISOweek2date(paste(year, paste0("W", sprintf("%02d", weekofyr))), 1, sep = "-"),
        end_date = begin_date+weeks(1)-days(1))

#number of unique MPLS ZCTAs
n_zcta <- length(unique(panel$zcta))

#vector of intersecting ZCTAs for filtering downstream
zcta_universe <- unique(panel$zcta)

```

## ZCTA-Week Level Police Data

```

#Minneapolis Police Department - Use of Force Dashboard
uof_spatial <- read_csv("Data/Police_Use_Of_Force.csv") %>%
  mutate(date=ymd_hms(ResponseDate),
        year=isoyear(date),
        week=isoweek(date)) %>%
  select(OBJECTID, year, week, X, Y, Race) %>%
  st_as_sf(coords = c("X", "Y"), crs = "NAD83", remove=F) %>%
  mutate(intersection = as.integer(st_intersects(geometry, zcta)),
        zcta = ifelse(is.na(intersection), NA, zcta$zcta[intersection])) %>%
  st_drop_geometry() %>%
  filter(!is.na(zcta) & year >= 2016 & year <= 2021 & zcta %in% zcta_universe) %>%
  group_by(year, week, zcta, Race, .drop=F) %>%
  tally(name = "use_of_force") %>%
  filter(!is.na(Race) & Race!="not recorded") %>%

```

```

ungroup() %>%
complete(year, week, zcta=zcta_universe, Race, fill = list(use_of_force = 0)) %>%
arrange(year, week, zcta, Race) %>%
mutate(race = str_to_lower(Race)) %>%
select(-Race) %>%
pivot_wider(names_from = race,
             values_from = use_of_force,
             values_fill = 0,
             names_glue = "{race}_{.value}") %>%
mutate(total_use_of_force = asian_use_of_force+black_use_of_force+`native american_use_of_force`+
       `other / mixed race_use_of_force`+`pacific islander_use_of_force`+unknown_use_of_force+
       white_use_of_force)

#MPD Stop Dashboard
stop_spatial <- read_csv("Data/Police_Stop_Data.csv") %>%
  mutate(date=ymd_hms(responseDate),
         year=isoyear(date),
         week=isoweek(date)) %>%
  select(OBJECTID, year, week, lat, long, race) %>%
  st_as_sf(coords = c("long", "lat"), crs = "NAD83", remove=F) %>%
  mutate(intersection = as.integer(st_intersects(geometry, zcta)),
         zcta = ifelse(is.na(intersection), NA, zcta$zcta[intersection])) %>%
  st_drop_geometry() %>%
  filter(!is.na(zcta) & year >= 2016 & year <= 2020 & zcta %in% zcta_universe) %>%
  group_by(year, week, zcta, race, .drop=F) %>%
  tally(name = "police_stops") %>%
  filter(!is.na(race) & race!="not recorded") %>%
  ungroup() %>%
  complete(year, week, zcta=zcta_universe, race, fill = list(police_stops = 0)) %>%
  mutate(race = str_to_lower(race)) %>%
  arrange(year, week, zcta, race) %>%
  pivot_wider(names_from = race,
             values_from = police_stops,
             values_fill = 0,
             names_glue = "{race}_{.value}") %>%
  mutate(total_police_stops = asian_police_stops+black_police_stops+
       `east african_police_stops`+latino_police_stops+`native american_police_stops`+
       other_police_stops+unknown_police_stops+white_police_stops)

#Officer Involved Shootings - MPD
ois_spatial <- read_csv("Data/Police_Officer_Involved_Shootings.csv") %>%
  mutate(date=ymd_hms(IncidentDate),
         year=isoyear(date),
         week=isoweek(date)) %>%
  select(OBJECTID, year, week, CenterLatitude, CenterLongitude, SubjectOfForceRace) %>%
  rename(race = SubjectOfForceRace,
         lat = CenterLatitude,
         long = CenterLongitude) %>%
  st_as_sf(coords = c("long", "lat"), crs = "NAD83", remove=F) %>%
  mutate(intersection = as.integer(st_intersects(geometry, zcta)),
         zcta = ifelse(is.na(intersection), NA, zcta$zcta[intersection])) %>%
  st_drop_geometry() %>%
  filter(!is.na(zcta) & year >= 2016 & year <= 2020 & zcta %in% zcta_universe) %>%
  group_by(year, week, zcta, race, .drop=F) %>%
  tally(name = "police_shootings") %>%
  filter(!is.na(race) & race!="not recorded") %>%
  ungroup() %>%
  complete(year=2016:2021, week=1:53, zcta=zcta_universe, race, fill = list(police_shootings = 0)) %>%
  mutate(race = str_to_lower(race)) %>%
  arrange(year, week, zcta, race) %>%
  pivot_wider(names_from = race,

```

```

      values_from = police_shootings,
      values_fill = 0,
      names_glue = "{race}_{.value}") %>%
mutate(total_police_shootings = asian_police_shootings+black_police_shootings+
      hispanic_police_shootings+other_police_shootings+
      unknown_police_shootings+white_police_shootings)

panel <- panel %>%
  left_join(uof_spatial, by = c("year", "weekofyr"="week", "zcta"="zcta")) %>%
  left_join(stop_spatial, by = c("year", "weekofyr"="week", "zcta"="zcta")) %>%
  left_join(ois_spatial, by = c("year", "weekofyr"="week", "zcta"="zcta"))

#creating period indicators for panel
panel <- panel %>%
  mutate(post_floyd = as.factor(as.numeric(begin_date >= as.Date("2020-05-25"))),
         post_floyd_3 = as.factor(as.numeric(begin_date >= as.Date("2020-05-25")+months(3))),
         stay_at_home = as.factor(as.numeric(begin_date >= as.Date("2020-03-28") &
         state_of_emerg = as.factor(as.numeric(begin_date >= as.Date("2020-03-13"))),
         weeks_post = as.numeric(begin_date-as.Date("2020-05-25"))/7,
         t_post_floyd = ifelse(weeks_post >=0,
                               weeks_post,
                               0),
         uof_rate = total_use_of_force/total_pop*1000,
         stops_rate = total_police_stops/total_pop*1000,
         ois_rate = total_police_shootings/total_pop*1000) %>%
  group_by(zcta) %>%
  arrange(year, weekofyr) %>%
  mutate(t = row_number(),
         uof_lag = dplyr::lag(uof_rate, 1),
         stops_lag = dplyr::lag(stops_rate, 1),
         shoot_lag = dplyr::lag(ois_rate, 1))

```

## Weather Data

```

# Minnesota DNR Daily Date
# https://www.dnr.state.mn.us/climate/historical/daily-data.html?sid=mspthr&sname=Minneapolis/St%20Paul%20Threaded
# Station Name: Minneapolis/St Paul Threaded Record - Station ID: mspthr

weather <- read_csv("Data/dnr_weather.csv") %>%
  mutate(year=isoyear(Date),
         week=isoweek(Date),
         precip_in = as.numeric(ifelse(`Precipitation (inches)`=="T", .001, `Precipitation (inches)`)),
         snow_in = as.numeric(ifelse(`Snow (inches)`=="T", .001, `Snow (inches)`)),
         tmax_f = `Maximum Temperature degrees (F)` %>%
  filter(year >= 2016 & year <= 2020) %>%
  select(year, week, precip_in, snow_in, tmax_f) %>%
  group_by(year, week) %>%
  summarize(precip_in = mean(precip_in, na.rm = T),
         snow_in = mean(snow_in, na.rm = T),
         tmax_f = mean(tmax_f, na.rm = T))

#join to panel
panel <- panel %>% left_join(weather, by = c("year","weekofyr"="week"))

```

# Time Series Construction - Week Level

## Aggregate Hospital Panel to Week-Level

*#panel to week-level, aggregating over ZCTAs*

```
hosp_series <- panel %>%  
  group_by(year, weekofyr) %>%  
  summarize(mh_all_tot = sum(mh_all_tot, na.rm = T),  
            white_mh_all_tot = sum(white_mh_all_tot, na.rm = T),  
            indig_mh_all_tot = sum(indig_mh_all_tot, na.rm = T),  
            asian_mh_all_tot = sum(asian_mh_all_tot, na.rm = T),  
            black_mh_all_tot = sum(black_mh_all_tot, na.rm = T),  
            latin_mh_all_tot = sum(latin_mh_all_tot, na.rm = T),  
            etoh_tot = sum(etoh_tot, na.rm = T),  
            black_etoh_tot = sum(black_etoh_tot, na.rm = T),  
            white_etoh_tot = sum(white_etoh_tot, na.rm = T),  
            latin_etoh_tot = sum(latin_etoh_tot, na.rm = T),  
            depress_tot = sum(Depress_tot, na.rm = T),  
            black_depress_tot = sum(black_Depress_tot, na.rm = T),  
            white_depress_tot = sum(white_Depress_tot, na.rm = T),  
            latin_depress_tot = sum(latin_Depress_tot, na.rm = T),  
            black_anxiety_tot = sum(black_anxiety_tot, na.rm = T),  
            white_anxiety_tot = sum(white_Depress_tot, na.rm = T),  
            latin_anxiety_tot = sum(latin_anxiety_tot, na.rm = T),  
            anxiety_tot = sum(anxiety_tot, na.rm = T),  
            chronic_tot = sum(chronic_tot, na.rm = T),  
            black_chronic_tot = sum(black_chronic_tot, na.rm = T),  
            white_chronic_tot = sum(black_chronic_tot, na.rm = T),  
            latin_chronic_tot = sum(latin_chronic_tot, na.rm = T),  
            acute_tot = sum(acute_tot, na.rm = T),  
            black_acute_tot = sum(black_acute_tot, na.rm = T),  
            white_acute_tot = sum(black_acute_tot, na.rm = T),  
            latin_acute_tot = sum(latin_acute_tot, na.rm = T),  
            total_pop = sum(total_pop, na.rm = T),  
            white_pop = sum(white_pop, na.rm = T),  
            na_pop = sum(na_pop, na.rm = T),  
            hisp_pop = sum(hisp_pop, na.rm = T),  
            asian_pop = sum(asian_pop, na.rm = T),  
            black_pop = sum(black_pop, na.rm = T)  
            ) %>%  
  mutate(mh_incid_c = (mh_all_tot/total_pop)*1000,  
         white_mh_incid_c = (white_mh_all_tot/white_pop)*1000,  
         indig_mh_incid_c = (indig_mh_all_tot/na_pop)*1000,  
         asian_mh_incid_c = (asian_mh_all_tot/asian_pop)*1000,  
         black_mh_incid_c = (black_mh_all_tot/black_pop)*1000,  
         latin_mh_incid_c = (latin_mh_all_tot/hisp_pop)*1000,  
         etoh_incid_c = (etoh_tot/total_pop)*1000,  
         black_etoh_incid_c = (black_etoh_tot/black_pop)*1000,  
         white_etoh_incid_c = (white_etoh_tot/white_pop)*1000,  
         latin_etoh_incid_c = (latin_etoh_tot/hisp_pop)*1000,  
         depress_incid_c = (depress_tot/total_pop)*1000,  
         black_depress_incid_c = (black_depress_tot/black_pop)*1000,  
         white_depress_incid_c = (white_depress_tot/white_pop)*1000,  
         latin_depress_incid_c = (latin_depress_tot/hisp_pop)*1000,  
         anxiety_incid_c = (anxiety_tot/total_pop)*1000,  
         black_anxiety_incid_c = (black_anxiety_tot/black_pop)*1000,  
         white_anxiety_incid_c = (white_anxiety_tot/white_pop)*1000,  
         latin_anxiety_incid_c = (latin_anxiety_tot/hisp_pop)*1000,  
         chronic_incid_c = (chronic_tot/total_pop)*1000,  
         black_chronic_incid_c = (black_chronic_tot/black_pop)*1000,  
         white_chronic_incid_c = (white_chronic_tot/white_pop)*1000,
```

```

    latin_chronic_incid_c = (latin_chronic_tot/hisp_pop)*1000,
    acute_incid_c = (acute_tot/total_pop)*1000,
    black_acute_incid_c = (black_acute_tot/black_pop)*1000,
    white_acute_incid_c = (white_acute_tot/white_pop)*1000,
    latin_acute_incid_c = (latin_acute_tot/hisp_pop)*1000) %>%
ungroup() %>%
mutate(week_id = row_number())

```

## Police Data Week-Level

*#Minneapolis Police Department - Use of Force Dashboard*

```

uof <- read_csv("Data/Police_Use_Of_Force.csv") %>%
  mutate(date=ymd_hms(ResponseDate),
         year=isoyear(date),
         week=isoweek(date)) %>%
  group_by(year, week, .drop=F) %>%
  tally(name = "use_of_force") %>%
  arrange(year, week) %>%
  ungroup() %>%
  select(year, week, everything())

```

*#merge onto series*

```

series <- hosp_series %>%
  left_join(uof, by=c("year", "weekofyr"="week")) %>%
  mutate(use_of_force_rate = (use_of_force/total_pop)*1000)

```

*#MPD Officer Involved Shootings*

```

ois <- read_csv("Data/Police_Officer_Involved_Shootings.csv") %>%
  mutate(date=ymd_hms(IncidentDate),
         year=isoyear(date),
         week=isoweek(date)) %>%
  group_by(year, week, .drop=F) %>%
  tally(name = "off_inv_shooting") %>%
  arrange(year, week) %>%
  ungroup() %>%
  select(year, week, everything())

```

*#merge onto series*

```

series <- series %>%
  left_join(ois, by=c("year", "weekofyr"="week")) %>%
  mutate(off_inv_shooting = ifelse(is.na(off_inv_shooting), 0, off_inv_shooting),
         off_inv_shooting_rate = (off_inv_shooting/total_pop)*1000)

```

*#Minneapolis Police Department - Police Stops Dashboard*

```

stop <- read_csv("Data/Police_Stop_Data.csv") %>%
  mutate(date=ymd_hms(responseDate),
         year=isoyear(date),
         week=isoweek(date)) %>%
  group_by(year, week, .drop=F) %>%
  tally(name = "police_stops")

```

*#merge onto series*

```

series <- series %>%
  left_join(stop, by = c("year", "weekofyr"="week")) %>%
  mutate(police_stop_rate = (police_stops/total_pop)*1000)

```

*#creating date variable*

*#removing week 53 of 2020*



```
series <- series %>%
  mutate(begin_date = ISOweek2date(paste(year, paste0("W", sprintf("%02d", weekofyr)), 1, sep = "-")),
         end_date = begin_date+weeks(1)-days(1)) %>%
  filter(!(year==2020 & weekofyr== 53)) %>%
  left_join(weather, by = c("year", "weekofyr"="week"))
```

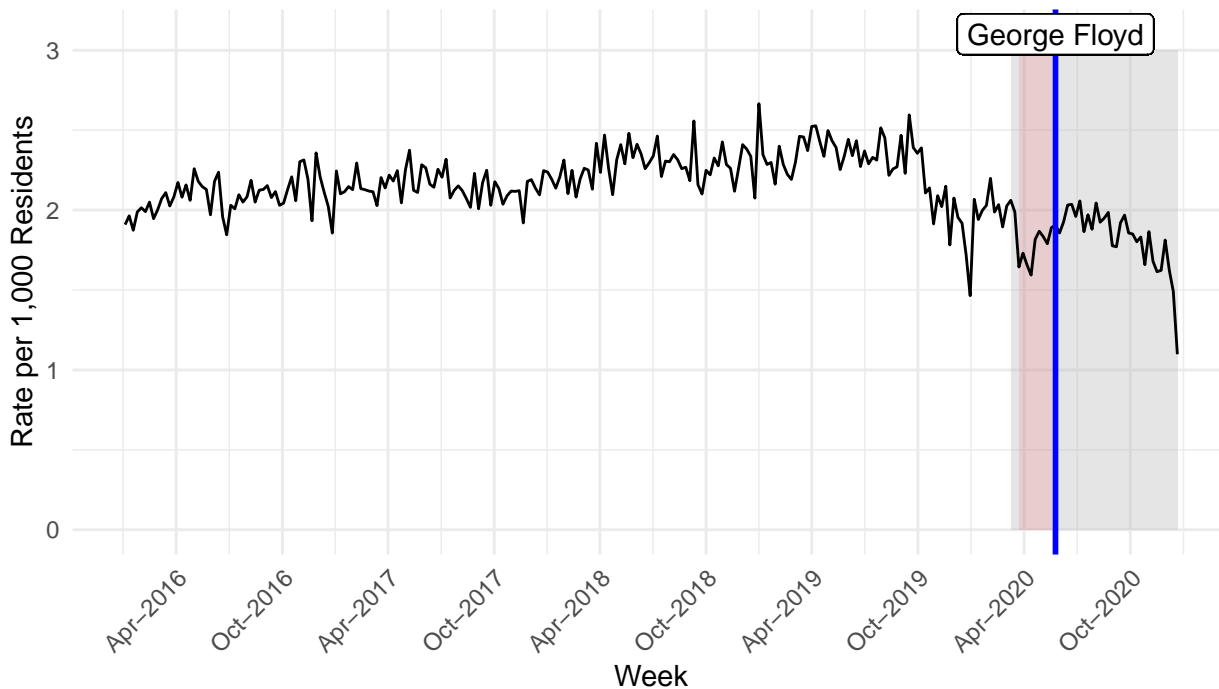
## Time Series Vizualization

```
ggplot(series)+
  scale_x_date(date_labels = "%b-%Y", date_breaks = "6 months")+
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-13"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-12-27"))],
    ymin = 0,
    ymax = 3,
    fill = "grey",
    alpha = .4) +
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-28"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-18"))],
    ymin = 0,
    ymax = 3,
    fill = "Red",
    alpha = .1) +
  scale_fill_manual(values=c("grey","red"), labels=c("Stay at Home", "State of Emergency")) +
  geom_line(aes(x=begin_date, y=mh_incid_c))+
  geom_vline(xintercept=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    linetype="solid", color="blue", size=1) +
  geom_label(aes(x=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    y=3.1),
    label = "George Floyd", show.legend = FALSE)+
  labs(title = "Figure 1: Weekly Mental Health Diagnoses, Minneapolis 2016-2020",
    subtitle = "MHA Hospital Data",
    x = "Week",
    y = "Rate per 1,000 Residents",
    fill = "MN COVID-19 Policy",
    caption = "The grey period represents the COVID-19 State of Emergency order,
    and the red represents the COVID-19 Stay at Home order.")+
  theme_minimal()+
  theme(axis.text.x=element_text(angle=45, hjust=1))
```



Figure 1: Weekly Mental Health Diagnoses, Minneapolis 2016–2020

MHA Hospital Data

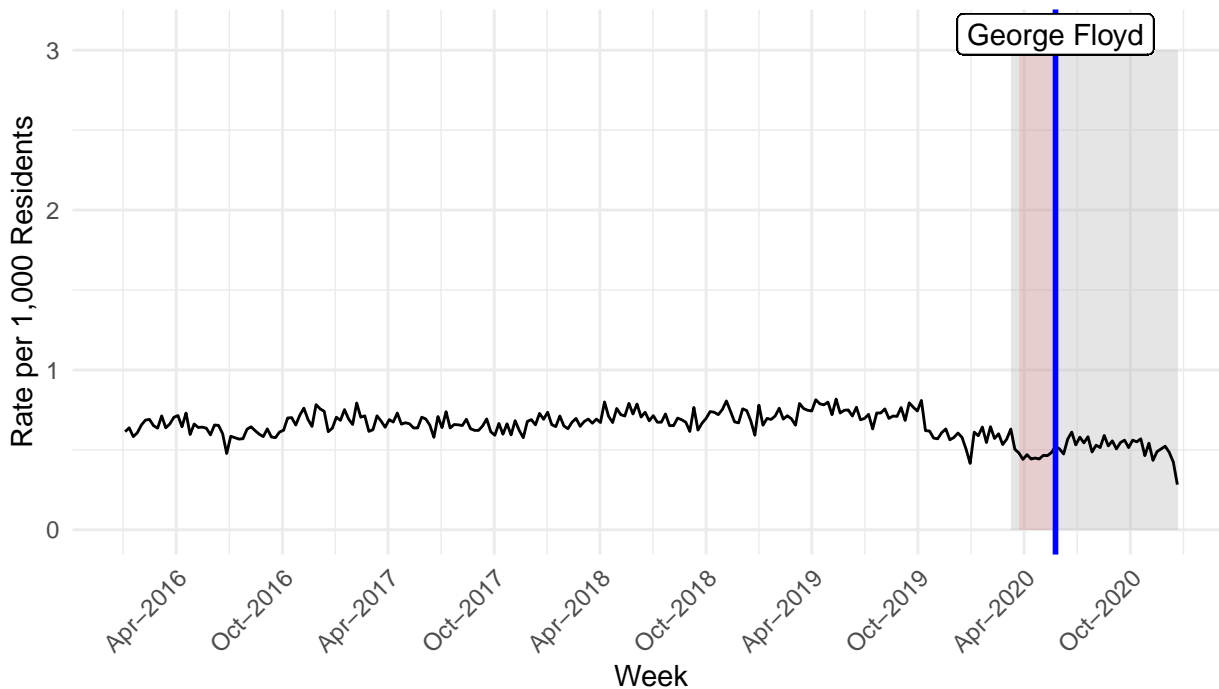


The grey period represents the COVID-19 State of Emergency order, and the red represents the COVID-19 Stay at Home order.

```
ggplot(series)+
  scale_x_date(date_labels = "%b-%Y", date_breaks = "6 months")+
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-13"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-12-27"))],
    ymin = 0,
    ymax = 3,
    fill = "grey",
    alpha = .4) +
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-28"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-18"))],
    ymin = 0,
    ymax = 3,
    fill = "Red",
    alpha = .1) +
  scale_fill_manual(values=c("grey","red"), labels=c("Stay at Home", "State of Emergency")) +
  geom_line(aes(x=begin_date, y=depress_incid_c))+
  geom_vline(xintercept=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    linetype="solid", color="blue", size=1) +
  geom_label(aes(x=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    y=3.1,
    label = "George Floyd", show.legend = FALSE))+
  labs(title = "Figure A1: Weekly Depression Diagnoses, Minneapolis 2016-2020",
    subtitle = "MHA Hospital Data",
    x = "Week",
    y = "Rate per 1,000 Residents",
    fill = "MN COVID-19 Policy",
    caption = "The grey period represents the COVID-19 State of Emergency order,
    and the red represents the COVID-19 Stay at Home order.")+
  theme_minimal()+
  theme(axis.text.x=element_text(angle=45, hjust=1))
```

Figure A1: Weekly Depression Diagnoses, Minneapolis 2016–2020

MHA Hospital Data

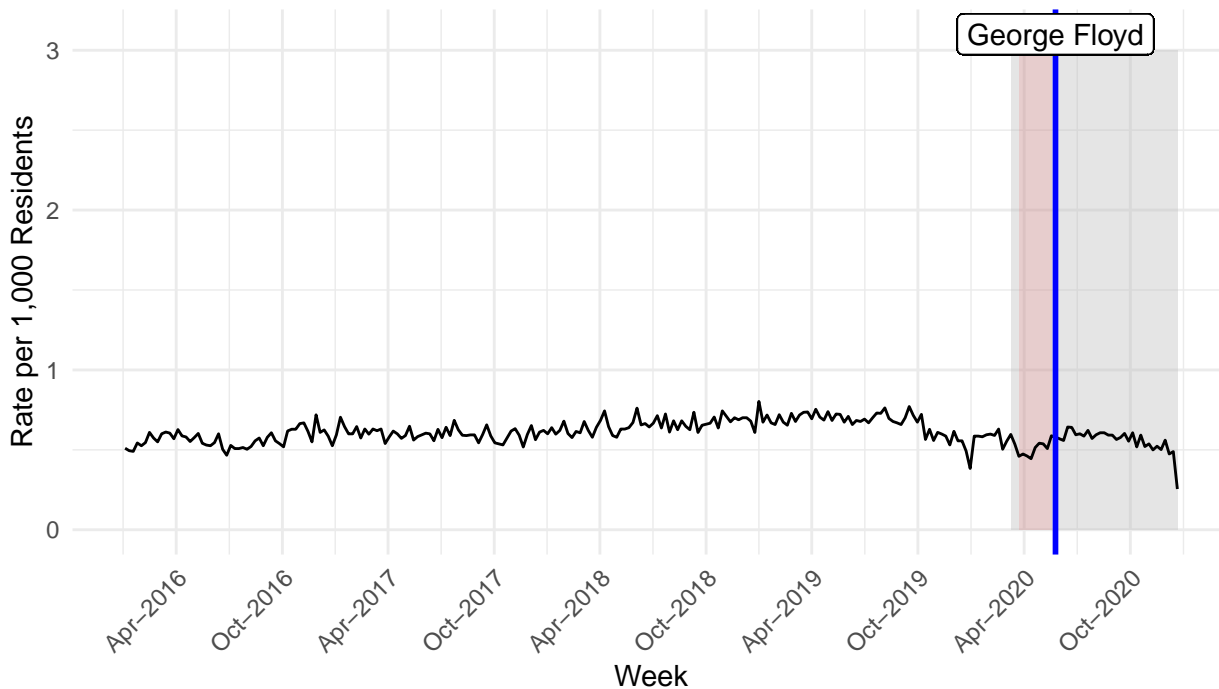


The grey period represents the COVID-19 State of Emergency order, and the red represents the COVID-19 Stay at Home order.

```
ggplot(series)+
  scale_x_date(date_labels = "%b-%Y", date_breaks = "6 months")+
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-13"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-12-27"))],
    ymin = 0,
    ymax = 3,
    fill = "grey",
    alpha = .4) +
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-28"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-18"))],
    ymin = 0,
    ymax = 3,
    fill = "Red",
    alpha = .1) +
  scale_fill_manual(values=c("grey","red"), labels=c("Stay at Home", "State of Emergency")) +
  geom_line(aes(x=begin_date, y=anxiety_incid_c))+
  geom_vline(xintercept=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    linetype="solid", color="blue", size=1) +
  geom_label(aes(x=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    y=3.1,
    label = "George Floyd", show.legend = FALSE))+
  labs(title = "Figure A6: Weekly Anxiety Diagnoses, Minneapolis 2016-2020",
    subtitle = "MHA Hospital Data",
    x = "Week",
    y = "Rate per 1,000 Residents",
    fill = "MN COVID-19 Policy",
    caption = "The grey period represents the COVID-19 State of Emergency order,
    and the red represents the COVID-19 Stay at Home order.")+
  theme_minimal()+
  theme(axis.text.x=element_text(angle=45, hjust=1))
```

Figure A6: Weekly Anxiety Diagnoses, Minneapolis 2016–2020

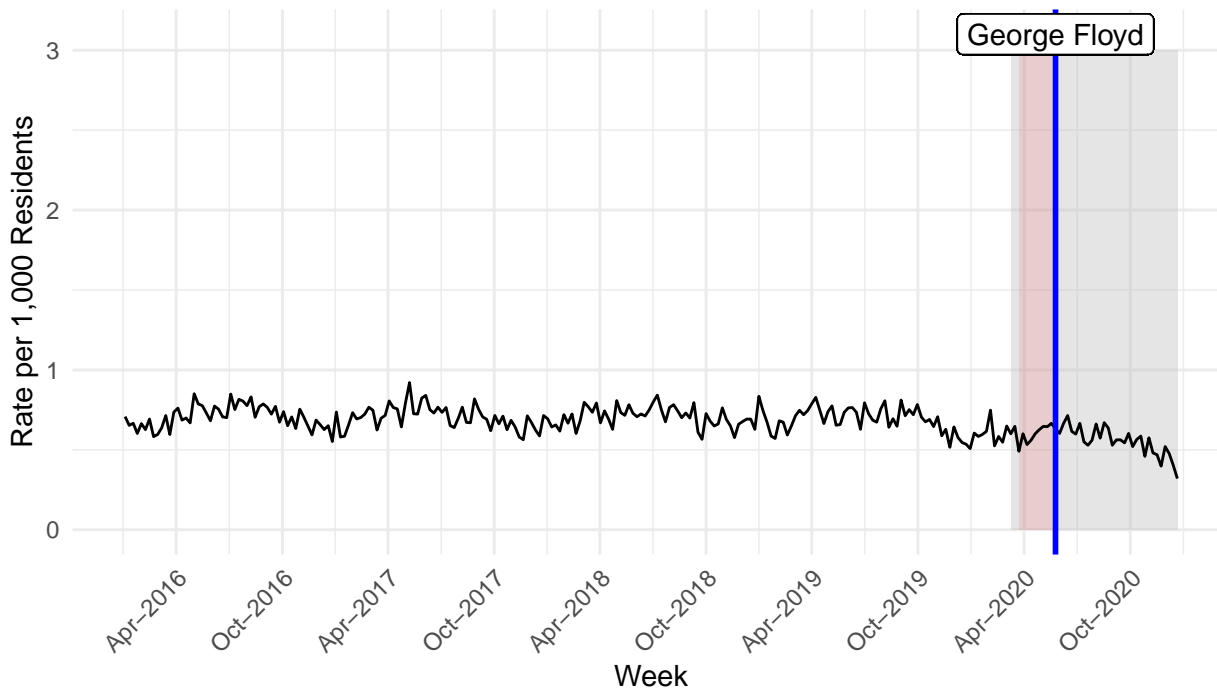
MHA Hospital Data



The grey period represents the COVID-19 State of Emergency order, and the red represents the COVID-19 Stay at Home order.

```
ggplot(series)+
  scale_x_date(date_labels = "%b-%Y", date_breaks = "6 months")+
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-13"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-12-27"))],
    ymin = 0,
    ymax = 3,
    fill = "grey",
    alpha = .4) +
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-28"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-18"))],
    ymin = 0,
    ymax = 3,
    fill = "Red",
    alpha = .1) +
  scale_fill_manual(values=c("grey","red"), labels=c("Stay at Home", "State of Emergency")) +
  geom_line(aes(x=begin_date, y=etoh_incident_c))+
  geom_vline(xintercept=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    linetype="solid", color="blue", size=1) +
  geom_label(aes(x=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    y=3.1,
    label = "George Floyd", show.legend = FALSE))+
  labs(title = "Figure A11: Weekly Alcohol Abuse Diagnoses, Minneapolis 2016-2020",
    subtitle = "MHA Hospital Data",
    x = "Week",
    y = "Rate per 1,000 Residents",
    fill = "MN COVID-19 Policy",
    caption = "The grey period represents the COVID-19 State of Emergency order,
    and the red represents the COVID-19 Stay at Home order.")+
  theme_minimal()+
  theme(axis.text.x=element_text(angle=45, hjust=1))
```

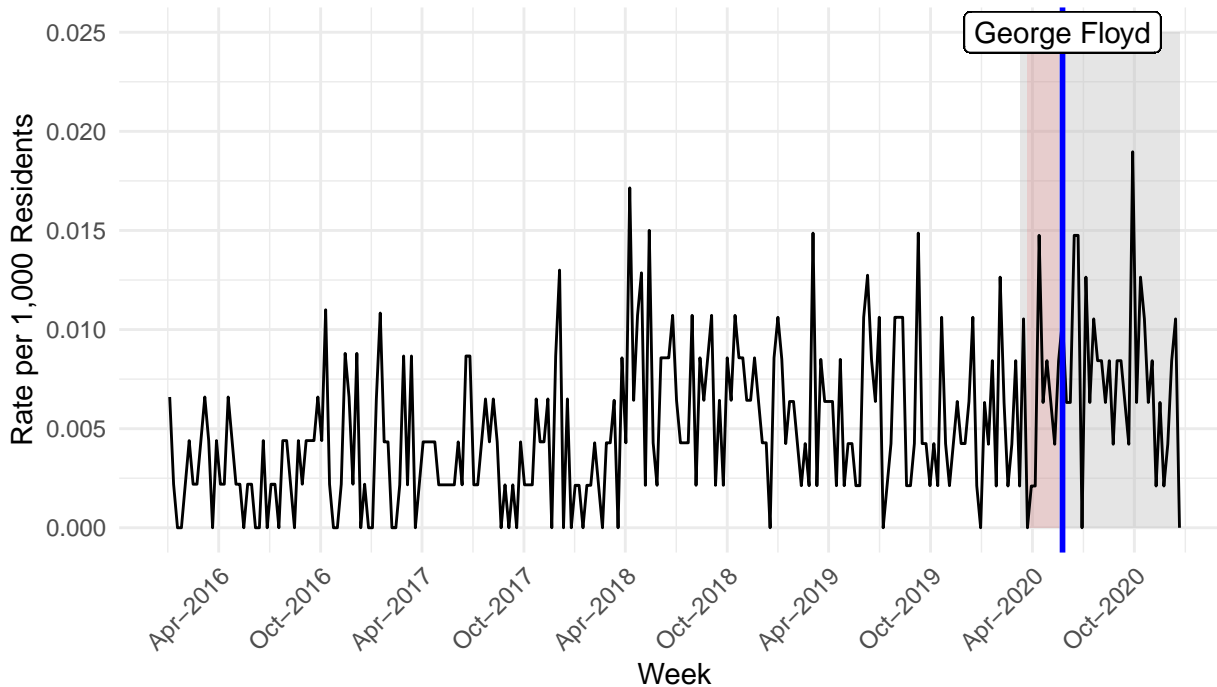
Figure A11: Weekly Alcohol Abuse Diagnoses, Minneapolis 2016–2020  
MHA Hospital Data



The grey period represents the COVID-19 State of Emergency order,  
and the red represents the COVID-19 Stay at Home order.

```
ggplot(series)+
  scale_x_date(date_labels = "%b-%Y", date_breaks = "6 months")+
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-13"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-12-27"))],
    ymin = 0,
    ymax = .025,
    fill = "grey",
    alpha = .4) +
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-28"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-18"))],
    ymin = 0,
    ymax = .025,
    fill = "Red",
    alpha = .1) +
  scale_fill_manual(values=c("grey","red"), labels=c("Stay at Home", "State of Emergency")) +
  geom_line(aes(x=begin_date, y=chronic_incid_c))+
  geom_vline(xintercept=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    linetype="solid", color="blue", size=1) +
  geom_label(aes(x=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    y=.025),
    label = "George Floyd", show.legend = FALSE)+
  labs(title = "Figure AX: Weekly Chronic MH Diagnoses, Minneapolis 2016-2020",
    subtitle = "MHA Hospital Data",
    x = "Week",
    y = "Rate per 1,000 Residents",
    fill = "MN COVID-19 Policy",
    caption = "The grey period represents the COVID-19 State of Emergency order,
    and the red represents the COVID-19 Stay at Home order.")+
  theme_minimal()+
  theme(axis.text.x=element_text(angle=45, hjust=1))
```

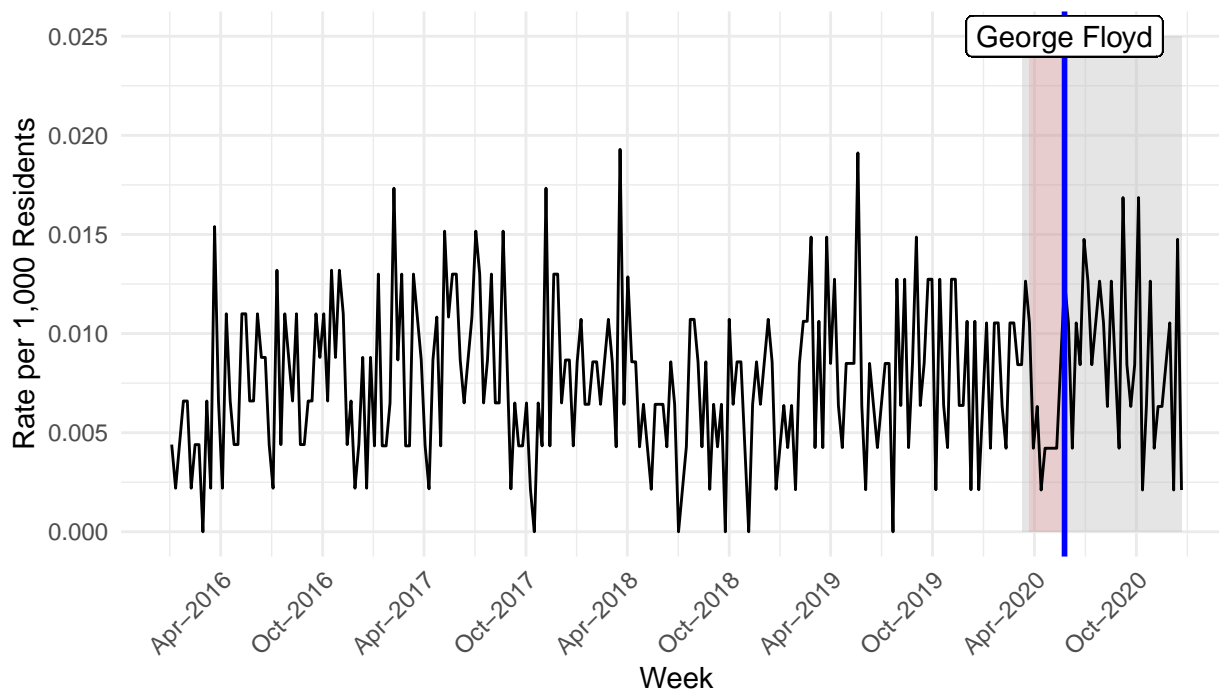
Figure AX: Weekly Chronic MH Diagnoses, Minneapolis 2016–2020  
MHA Hospital Data



The grey period represents the COVID–19 State of Emergency order,  
and the red represents the COVID–19 Stay at Home order.

```
ggplot(series)+
  scale_x_date(date_labels = "%b-%Y", date_breaks = "6 months")+
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-13"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-12-27"))],
    ymin = 0,
    ymax = .025,
    fill = "grey",
    alpha = .4) +
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-28"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-18"))],
    ymin = 0,
    ymax = .025,
    fill = "Red",
    alpha = .1) +
  scale_fill_manual(values=c("grey","red"), labels=c("Stay at Home", "State of Emergency")) +
  geom_line(aes(x=begin_date, y=acute_incid_c))+
  geom_vline(xintercept=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    linetype="solid", color="blue", size=1) +
  geom_label(aes(x=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    y=.025),
    label = "George Floyd", show.legend = FALSE)+
  labs(title = "Figure AX: Weekly Acute MH Diagnoses, Minneapolis 2016–2020",
    subtitle = "MHA Hospital Data",
    x = "Week",
    y = "Rate per 1,000 Residents",
    fill = "MN COVID-19 Policy",
    caption = "The grey period represents the COVID-19 State of Emergency order,
    and the red represents the COVID-19 Stay at Home order.")+
  theme_minimal()+
  theme(axis.text.x=element_text(angle=45, hjust=1))
```

Figure AX: Weekly Acute MH Diagnoses, Minneapolis 2016–2020  
MHA Hospital Data

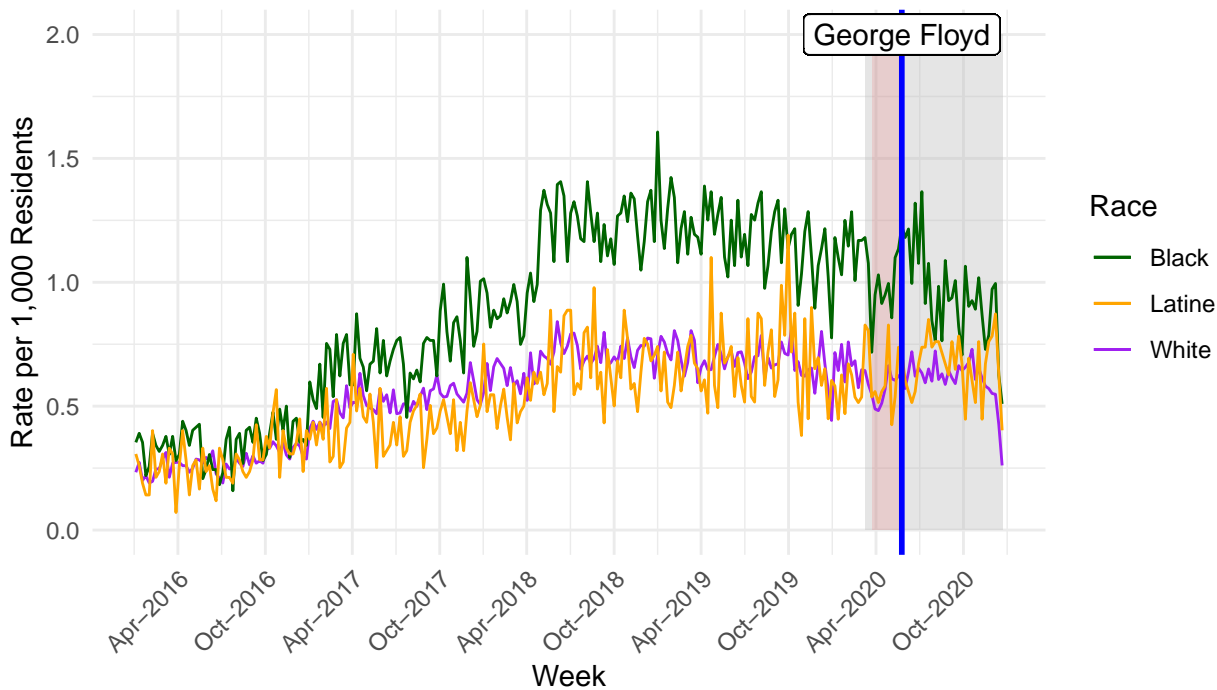


The grey period represents the COVID-19 State of Emergency order,  
and the red represents the COVID-19 Stay at Home order.

```
ggplot(series)+
  scale_x_date(date_labels = "%b-%Y", date_breaks = "6 months")+
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-13"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-12-27"))],
    ymin = 0,
    ymax = 2,
    fill = "grey",
    alpha = .4) +
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-28"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-18"))],
    ymin = 0,
    ymax = 2,
    fill = "Red",
    alpha = .1) +
  scale_fill_manual(values=c("grey","red"), labels=c("Stay at Home", "State of Emergency")) +
  geom_line(aes(x=begin_date, y=white_mh_incid_c, color = "White"))+
  geom_line(aes(x=begin_date, y=black_mh_incid_c, color = "Black"))+
  geom_line(aes(x=begin_date, y=latin_mh_incid_c, color = "Latine"))+
  geom_vline(xintercept=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    linetype="solid", color="blue", size=1) +
  geom_label(aes(x=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    y=2),
    label = "George Floyd", show.legend = FALSE)+
  labs(title = "Figure 2: Weekly Mental Health Diagnoses by Race, Minneapolis 2016-2020",
    subtitle = "MHA Hospital Data",
    x = "Week",
    y = "Rate per 1,000 Residents",
    fill = "MN COVID-19 Policy",
    color = "Race",
    caption = "The grey period represents the COVID-19 State of Emergency order,
    and the red represents the COVID-19 Stay at Home order.")+
```

```
theme_minimal()+
  theme(axis.text.x=element_text(angle=45, hjust=1)) +
  scale_color_manual(values = c("darkgreen", "orange", "purple"))
```

Figure 2: Weekly Mental Health Diagnoses by Race, Minneapolis 2016–2020  
MHA Hospital Data



The grey period represents the COVID-19 State of Emergency order,  
and the red represents the COVID-19 Stay at Home order.

```
ggplot(series)+
  scale_x_date(date_labels = "%b-%Y", date_breaks = "6 months")+
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-13"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-12-27"))],
    ymin = 0,
    ymax = 2,
    fill = "grey",
    alpha = .4) +
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-28"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-18"))],
    ymin = 0,
    ymax = 2,
    fill = "Red",
    alpha = .1) +
  scale_fill_manual(values=c("grey","red"), labels=c("Stay at Home", "State of Emergency")) +
  geom_line(aes(x=begin_date, y=white_depress_incid_c, color = "White"))+
  geom_line(aes(x=begin_date, y=black_depress_incid_c, color = "Black"))+
  geom_line(aes(x=begin_date, y=latin_depress_incid_c, color = "Latine"))+
  geom_vline(xintercept=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    linetype="solid", color="blue", size=1) +
  geom_label(aes(x=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    y=2),
    label = "George Floyd", show.legend = FALSE)+
  labs(title = "Figure A2: Weekly Depression Diagnoses by Race, Minneapolis 2016-2020",
    subtitle = "MHA Hospital Data",
    x = "Week",
    y = "Rate per 1,000 Residents",
```

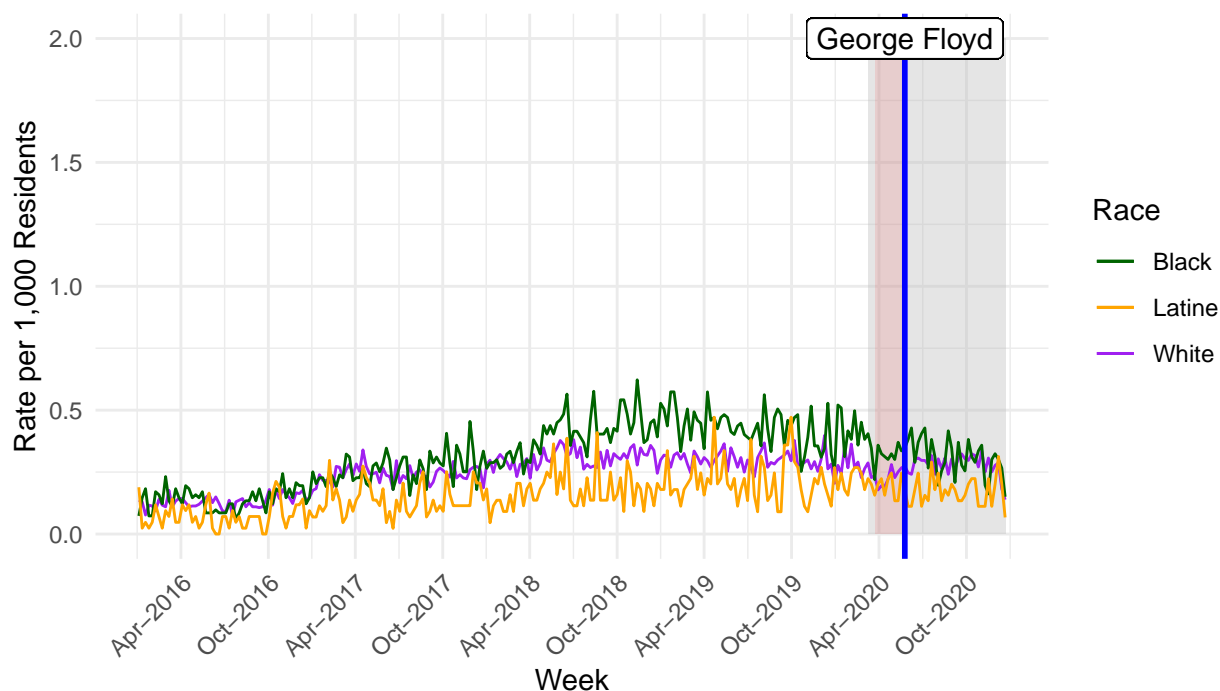


```

fill = "MN COVID-19 Policy",
color = "Race",
caption = "The grey period represents the COVID-19 State of Emergency order,
and the red represents the COVID-19 Stay at Home order.") +
theme_minimal() +
  theme(axis.text.x=element_text(angle=45, hjust=1)) +
  scale_color_manual(values = c("darkgreen", "orange", "purple"))

```

Figure A2: Weekly Depression Diagnoses by Race, Minneapolis 2016–2020  
MHA Hospital Data



The grey period represents the COVID-19 State of Emergency order,  
and the red represents the COVID-19 Stay at Home order.

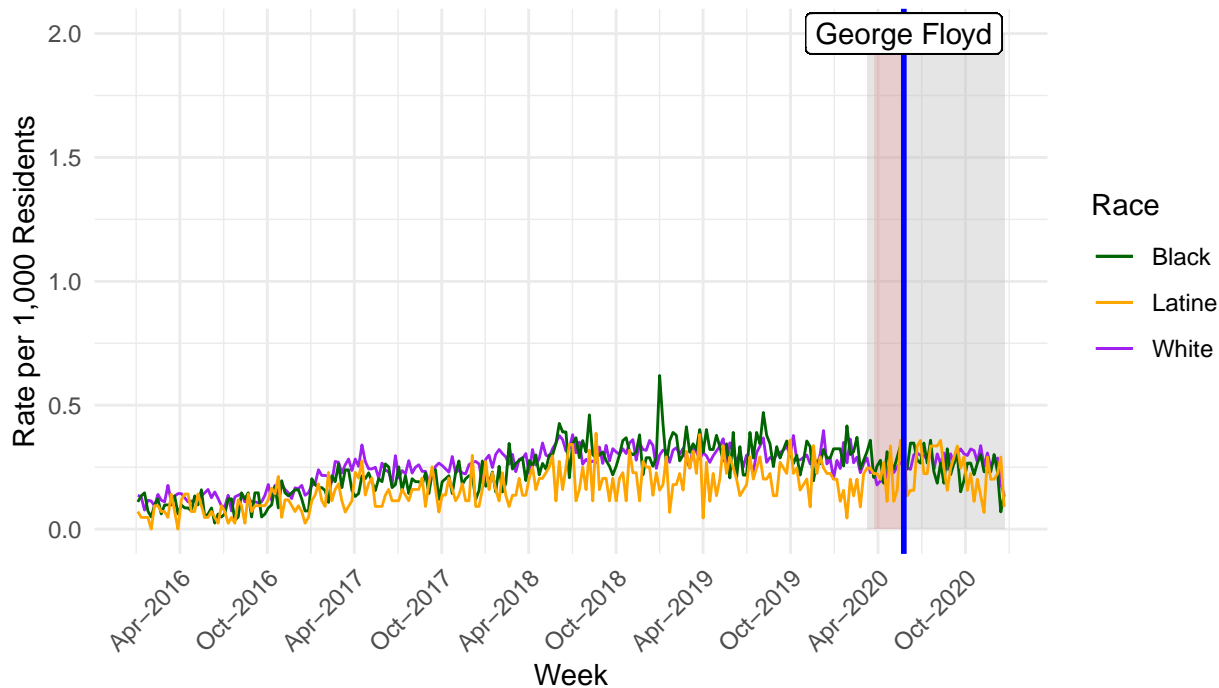
```

ggplot(series) +
  scale_x_date(date_labels = "%b-%Y", date_breaks = "6 months") +
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-13"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-12-27"))],
    ymin = 0,
    ymax = 2,
    fill = "grey",
    alpha = .4) +
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-28"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-18"))],
    ymin = 0,
    ymax = 2,
    fill = "Red",
    alpha = .1) +
  scale_fill_manual(values=c("grey","red"), labels=c("Stay at Home", "State of Emergency")) +
  geom_line(aes(x=begin_date, y=white_anxiety_incid_c, color = "White")) +
  geom_line(aes(x=begin_date, y=black_anxiety_incid_c, color = "Black")) +
  geom_line(aes(x=begin_date, y=latin_anxiety_incid_c, color = "Latine")) +
  geom_vline(xintercept=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    linetype="solid", color="blue", size=1) +
  geom_label(aes(x=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
    y=2),
    label = "George Floyd", show.legend = FALSE) +

```

```
labs(title = "Figure A7: Weekly Anxiety Diagnoses by Race, Minneapolis 2016-2020",
     subtitle = "MHA Hospital Data",
     x = "Week",
     y = "Rate per 1,000 Residents",
     fill = "MN COVID-19 Policy",
     color = "Race",
     caption = "The grey period represents the COVID-19 State of Emergency order,
     and the red represents the COVID-19 Stay at Home order.") +
theme_minimal() +
  theme(axis.text.x=element_text(angle=45, hjust=1)) +
  scale_color_manual(values = c("darkgreen", "orange", "purple"))
```

Figure A7: Weekly Anxiety Diagnoses by Race, Minneapolis 2016–2020  
MHA Hospital Data



The grey period represents the COVID-19 State of Emergency order,  
and the red represents the COVID-19 Stay at Home order.

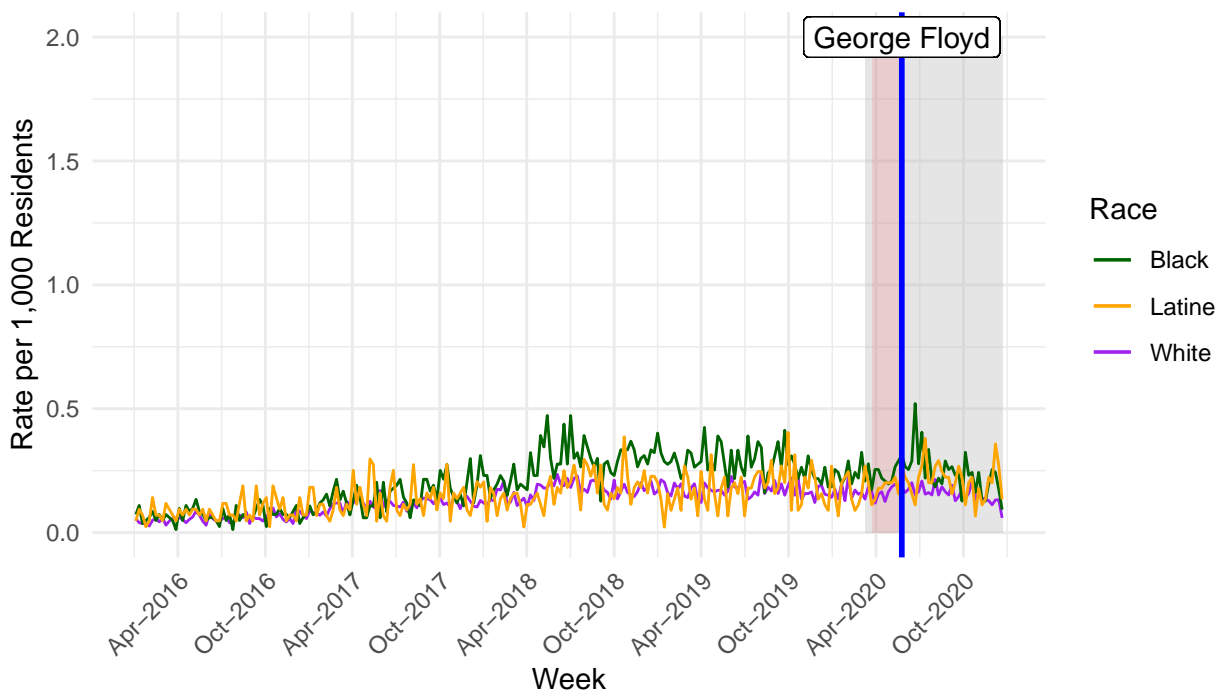
```
ggplot(series) +
  scale_x_date(date_labels = "%b-%Y", date_breaks = "6 months") +
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-13"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-12-27"))],
    ymin = 0,
    ymax = 2,
    fill = "grey",
    alpha = .4) +
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-28"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-18"))],
    ymin = 0,
    ymax = 2,
    fill = "Red",
    alpha = .1) +
  scale_fill_manual(values=c("grey","red"), labels=c("Stay at Home", "State of Emergency")) +
  geom_line(aes(x=begin_date, y=white_eto_h_incid_c, color = "White")) +
  geom_line(aes(x=begin_date, y=black_eto_h_incid_c, color = "Black")) +
  geom_line(aes(x=begin_date, y=latin_eto_h_incid_c, color = "Latine")) +
  geom_vline(xintercept=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
```

```

linetype="solid", color="blue", size=1) +
geom_label(aes(x=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
y=2),
label = "George Floyd", show.legend = FALSE)+
labs(title = "Figure A12: Weekly Alcohol Diagnoses by Race, Minneapolis 2016-2020",
subtitle = "MHA Hospital Data",
x = "Week",
y = "Rate per 1,000 Residents",
fill = "MN COVID-19 Policy",
color = "Race",
caption = "The grey period represents the COVID-19 State of Emergency order,
and the red represents the COVID-19 Stay at Home order.")+
theme_minimal()+
theme(axis.text.x=element_text(angle=45, hjust=1)) +
scale_color_manual(values = c("darkgreen", "orange", "purple"))

```

Figure A12: Weekly Alcohol Diagnoses by Race, Minneapolis 2016–2020  
MHA Hospital Data



The grey period represents the COVID-19 State of Emergency order,  
and the red represents the COVID-19 Stay at Home order.

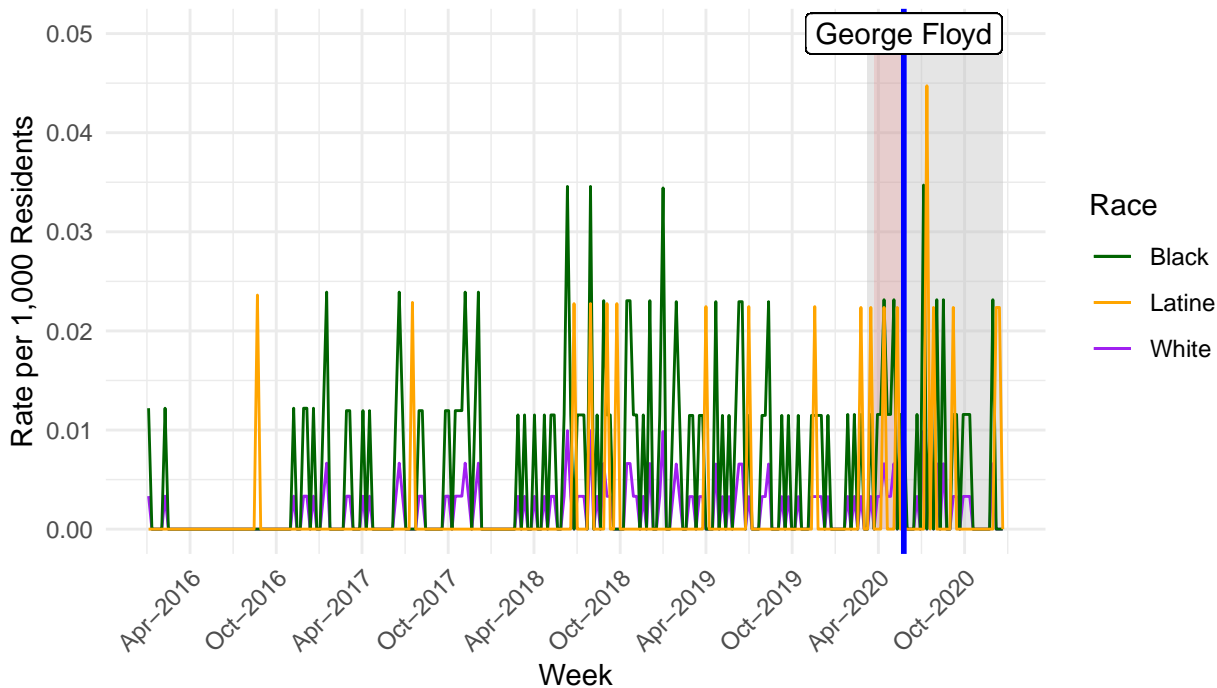
```

ggplot(series)+
scale_x_date(date_labels = "%b-%Y", date_breaks = "6 months")+
annotate(geom="rect",
xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-13"))],
xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-12-27"))],
ymin = 0,
ymax = .05,
fill = "grey",
alpha = .4) +
annotate(geom="rect",
xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-28"))],
xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-18"))],
ymin = 0,
ymax = .05,
fill = "Red",
alpha = .1) +
scale_fill_manual(values=c("grey","red"), labels=c("Stay at Home", "State of Emergency")) +

```

```
geom_line(aes(x=begin_date, y=white_chronic_incid_c, color = "White"))+
geom_line(aes(x=begin_date, y=black_chronic_incid_c, color = "Black"))+
geom_line(aes(x=begin_date, y=latine_chronic_incid_c, color = "Latine"))+
geom_vline(xintercept=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
  linetype="solid", color="blue", size=1) +
geom_label(aes(x=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
  y=.05),
  label = "George Floyd", show.legend = FALSE)+
labs(title = "Figure AX: Weekly Chronic Diagnoses by Race, Minneapolis 2016-2020",
  subtitle = "MHA Hospital Data",
  x = "Week",
  y = "Rate per 1,000 Residents",
  fill = "MN COVID-19 Policy",
  color = "Race",
  caption = "The grey period represents the COVID-19 State of Emergency order,
  and the red represents the COVID-19 Stay at Home order.")+
theme_minimal()+
  theme(axis.text.x=element_text(angle=45, hjust=1)) +
  scale_color_manual(values = c("darkgreen", "orange", "purple"))
```

Figure AX: Weekly Chronic Diagnoses by Race, Minneapolis 2016–2020  
MHA Hospital Data



The grey period represents the COVID–19 State of Emergency order,  
and the red represents the COVID–19 Stay at Home order.

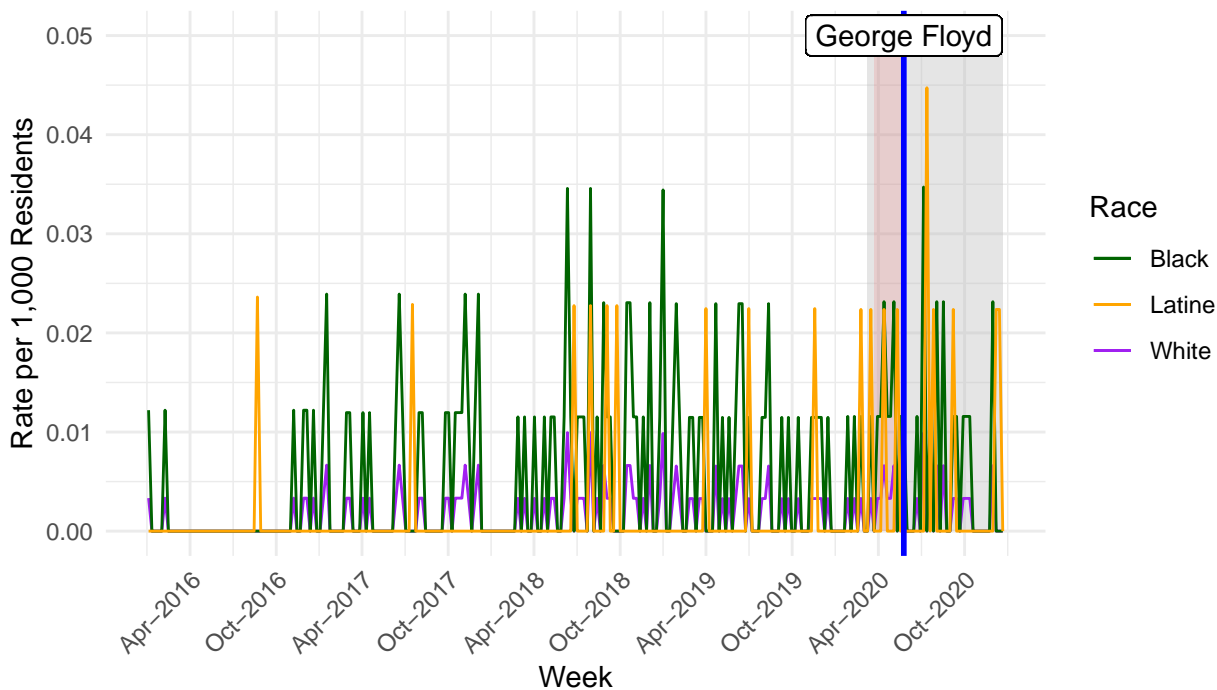
```
ggplot(series)+
scale_x_date(date_labels = "%b-%Y", date_breaks = "6 months")+
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-13"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-12-27"))],
    ymin = 0,
    ymax = .05,
    fill = "grey",
    alpha = .4) +
  annotate(geom="rect",
    xmin = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-03-28"))],
    xmax = series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-18"))],
    ymin = 0,
```

```

ymax = .05,
fill = "Red",
alpha = .1) +
scale_fill_manual(values=c("grey","red"), labels=c("Stay at Home", "State of Emergency")) +
geom_line(aes(x=begin_date, y=white_chronic_incid_c, color = "White"))+
geom_line(aes(x=begin_date, y=black_chronic_incid_c, color = "Black"))+
geom_line(aes(x=begin_date, y=latine_chronic_incid_c, color = "Latine"))+
geom_vline(xintercept=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
linetype="solid", color="blue", size=1) +
geom_label(aes(x=series$begin_date[series$year==2020 & series$weekofyr==isoweek(date("2020-05-25"))],
y=.05),
label = "George Floyd", show.legend = FALSE)+
labs(title = "Figure AX: Weekly Acute Diagnoses by Race, Minneapolis 2016-2020",
subtitle = "MHA Hospital Data",
x = "Week",
y = "Rate per 1,000 Residents",
fill = "MN COVID-19 Policy",
color = "Race",
caption = "The grey period represents the COVID-19 State of Emergency order,
and the red represents the COVID-19 Stay at Home order.")+
theme_minimal()+
theme(axis.text.x=element_text(angle=45, hjust=1)) +
scale_color_manual(values = c("darkgreen", "orange", "purple"))

```

Figure AX: Weekly Acute Diagnoses by Race, Minneapolis 2016–2020  
MHA Hospital Data



The grey period represents the COVID-19 State of Emergency order,  
and the red represents the COVID-19 Stay at Home order.

## Time Series Analysis

$$y_t = \beta_0 + \beta_1 \text{Time}_t + \theta \text{Event}_t + \beta_2 \text{TimePost}_t + \phi \mathbf{X}_t + \rho_1 y_{t-1} + \rho_2 y_{t-2} + \rho_3 y_{t-3} + \epsilon_t$$

```

series <- series %>%
  mutate(t = 1:length(mh_incid_c),
         post_floyd = as.factor(as.numeric(begin_date >= as.Date("2020-05-25"))),
         post_floyd_3 = as.factor(as.numeric(begin_date >= as.Date("2020-05-25")+months(3))),
         stay_at_home = as.factor(as.numeric(begin_date >= as.Date("2020-03-28") &

```

```

state_of_emerg = as.factor(as.numeric(begin_date >= as.Date("2020-03-13"))),
weeks_post = as.numeric(begin_date-as.Date("2020-05-25"))/7,
t_post_floyd = ifelse(weeks_post >=0,
                      weeks_post,
                      0),
uof_lag=lag(use_of_force_rate,1),
stops_lag = lag(police_stop_rate,1),
shoot_lag = lag(off_inv_shooting_rate,1))

mean(series$mh_incid_c[series$post_floyd==0 & series$weeks_post %in% c(-1, -2, -3, -4)])

## [1] 1.845131
mean(series$mh_incid_c[series$post_floyd==1 & series$weeks_post %in% c(0,1,2,3)])

## [1] 1.929959
mean(series$black_mh_incid_c[series$post_floyd==0 & series$weeks_post %in% c(-1, -2, -3, -4)])

## [1] 1.021377
mean(series$black_mh_incid_c[series$post_floyd==1 & series$weeks_post %in% c(0,1,2,3)])

## [1] 1.154474
mean(series$white_mh_incid_c[series$post_floyd==0 & series$weeks_post %in% c(-1, -2, -3, -4)])

## [1] 0.6247813
mean(series$white_mh_incid_c[series$post_floyd==1 & series$weeks_post %in% c(0,1,2,3)])

## [1] 0.6404627
mean(series$latin_mh_incid_c[series$post_floyd==0 & series$weeks_post %in% c(-1, -2, -3, -4)])

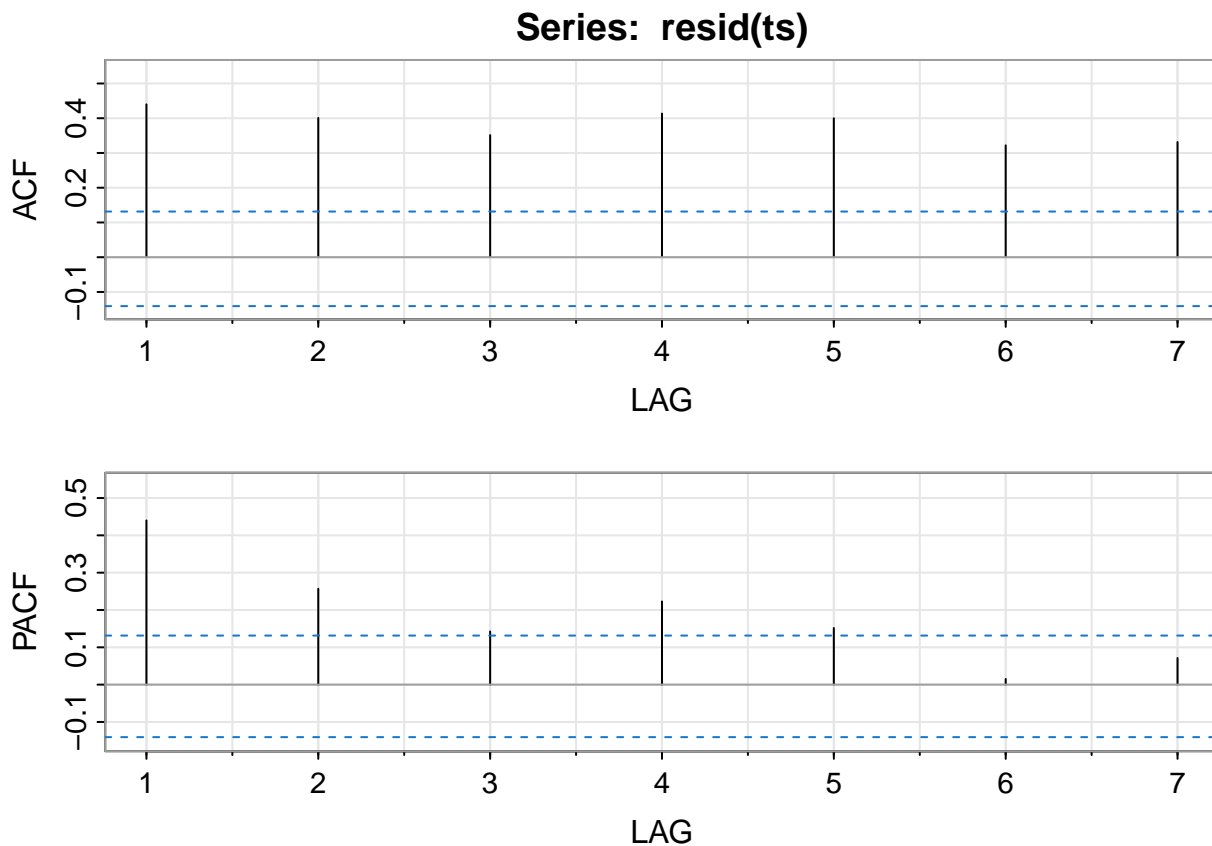
## [1] 0.6318638
mean(series$latin_mh_incid_c[series$post_floyd==1 & series$weeks_post %in% c(0,1,2,3)])

## [1] 0.5983135
ts <- lm(mh_incid_c~t+state_of_emerg+stay_at_home+post_floyd+t_post_floyd+
         tmax_f+snow_in+precip_in+
         uof_lag+stops_lag+shoot_lag,
         data = series)
summary(ts)

##
## Call:
## lm(formula = mh_incid_c ~ t + state_of_emerg + stay_at_home +
##     post_floyd + t_post_floyd + tmax_f + snow_in + precip_in +
##     uof_lag + stops_lag + shoot_lag, data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.74180 -0.06998  0.00004  0.08675  0.49258
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   2.090e+00  9.567e-02  21.845  < 2e-16 ***
## t              1.091e-04  3.045e-04   0.358  0.720385
## state_of_emerg1 -3.898e-01  9.412e-02 -4.141  5.06e-05 ***
## stay_at_home1  -9.756e-02  9.716e-02 -1.004  0.316495
## post_floyd1     9.963e-02  1.019e-01  0.977  0.329542
## t_post_floyd   -1.372e-02  3.525e-03 -3.893  0.000134 ***
## tmax_f          3.227e-03  6.547e-04  4.929  1.71e-06 ***
## snow_in         2.249e-02  2.845e-02  0.790  0.430197

```

```
## precip_in      -1.318e-01  9.986e-02 -1.320 0.188389
## uof_lag        3.454e-01  2.266e-01  1.524 0.129040
## stops_lag     -4.002e-02  3.732e-02 -1.072 0.284874
## shoot_lag     -1.344e+01  6.542e+00 -2.054 0.041213 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1515 on 204 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.5958, Adjusted R-squared:  0.574
## F-statistic: 27.34 on 11 and 204 DF, p-value: < 2.2e-16
acf2(resid(ts), max.lag = 7)
```



```
##      [,1] [,2] [,3] [,4] [,5] [,6] [,7]
## ACF  0.44 0.40 0.35 0.41 0.40 0.32 0.33
## PACF 0.44 0.26 0.14 0.22 0.15 0.02 0.07
ts_ar3<- lm(mh_incid_c~t+post_floyd+t_post_floyd+
            state_of_emerg+stay_at_home+
              uof_lag+stops_lag+shoot_lag+
              tmax_f+snow_in+precip_in+
              dplyr::lag(mh_incid_c, 1)+ dplyr::lag(mh_incid_c, 2)+
              dplyr::lag(mh_incid_c, 3),
            data = series)
summary(ts_ar3)

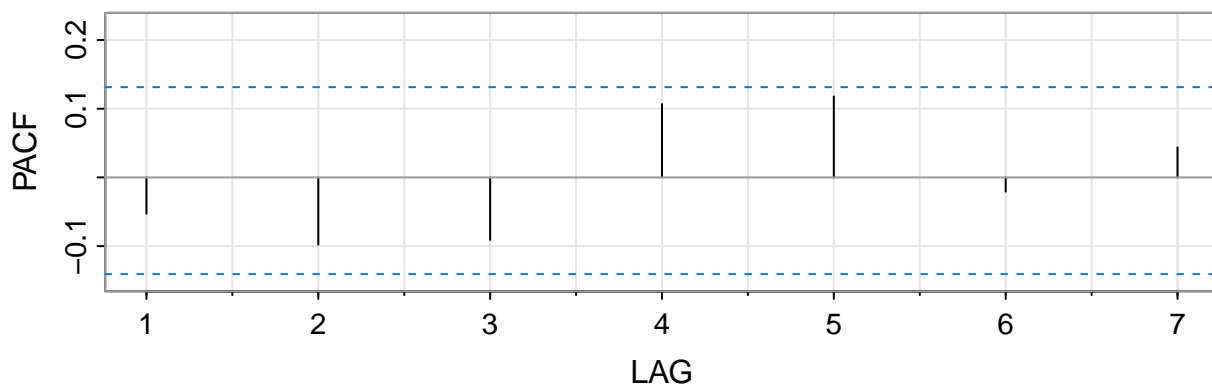
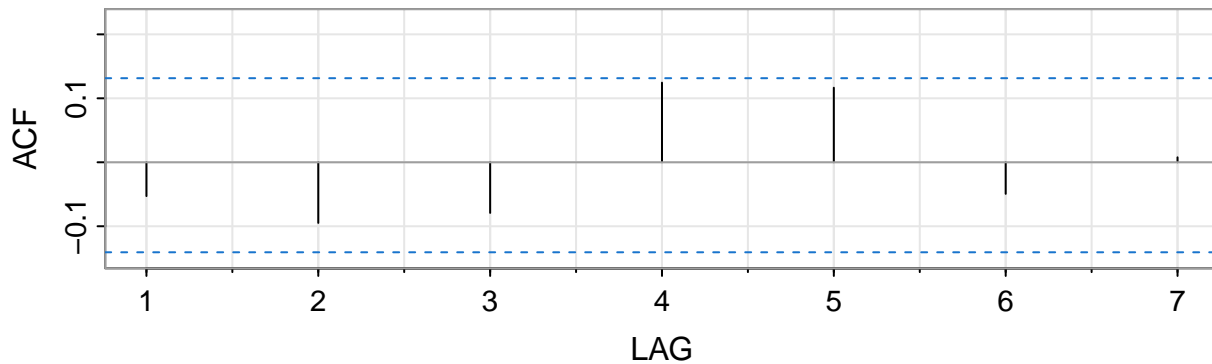
##
## Call:
## lm(formula = mh_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##     stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##     snow_in + precip_in + dplyr::lag(mh_incid_c, 1) + dplyr::lag(mh_incid_c,
##     2) + dplyr::lag(mh_incid_c, 3), data = series)
##
## Residuals:
```



```
##      Min      1Q   Median      3Q      Max
## -0.47460 -0.07316  0.00035  0.06877  0.45214
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      6.026e-01  1.763e-01   3.419 0.000761 ***
## t                -8.530e-05  2.543e-04  -0.335 0.737660
## post_floyd1       1.521e-01  8.530e-02   1.783 0.076035 .
## t_post_floyd      -9.641e-03  2.982e-03  -3.233 0.001432 **
## state_of_emerg1    -1.983e-01  8.114e-02  -2.444 0.015369 *
## stay_at_home1      6.598e-02  8.267e-02   0.798 0.425733
## uof_lag           3.949e-01  1.899e-01   2.080 0.038777 *
## stops_lag         -3.024e-02  3.122e-02  -0.969 0.333831
## shoot_lag         -1.111e+01  5.476e+00  -2.029 0.043792 *
## tmax_f            1.523e-03  5.772e-04   2.638 0.008983 **
## snow_in           1.081e-02  2.382e-02   0.454 0.650417
## precip_in        -2.597e-01  8.442e-02  -3.077 0.002385 **
## dplyr::lag(mh_incid_c, 1) 3.165e-01  6.910e-02   4.580 8.15e-06 ***
## dplyr::lag(mh_incid_c, 2) 2.676e-01  6.952e-02   3.849 0.000159 ***
## dplyr::lag(mh_incid_c, 3) 1.344e-01  6.850e-02   1.962 0.051191 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1261 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.7241, Adjusted R-squared:  0.7049
## F-statistic: 37.68 on 14 and 201 DF,  p-value: < 2.2e-16
```

```
acf2(resid(ts_ar3), max.lag = 7)
```

**Series: resid(ts\_ar3)**



```
##      [,1] [,2] [,3] [,4] [,5] [,6] [,7]
## ACF  -0.05 -0.09 -0.08 0.12 0.12 -0.05 0.01
## PACF -0.05 -0.10 -0.09 0.11 0.12 -0.02 0.04
```

### #race specific models

```
ts_ar3_white <- lm(white_mh_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(white_mh_incid_c, 1)+ dplyr::lag(white_mh_incid_c, 2)+
  dplyr::lag(white_mh_incid_c, 3),
  data = series)
summary(ts_ar3_white)
```

```
##
## Call:
## lm(formula = white_mh_incid_c ~ t + post_floyd + t_post_floyd +
##     state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##     tmax_f + snow_in + precip_in + dplyr::lag(white_mh_incid_c,
##     1) + dplyr::lag(white_mh_incid_c, 2) + dplyr::lag(white_mh_incid_c,
##     3), data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.20534 -0.03435 -0.00292  0.03864  0.16128
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.0583648   0.0430397   1.356  0.17660
## t              0.0003492   0.0001858   1.880  0.06154 .
## post_floyd1    0.0611223   0.0423438   1.443  0.15044
## t_post_floyd  -0.0045809   0.0014674  -3.122  0.00206 **
## state_of_emerg1 -0.0570625   0.0404843  -1.409  0.16023
## stay_at_home1  0.0158191   0.0406328   0.389  0.69745
## uof_lag        0.2325829   0.0952384   2.442  0.01547 *
## stops_lag      0.0032765   0.0158027   0.207  0.83596
## shoot_lag     -3.5962851   2.7322235  -1.316  0.18959
## tmax_f         0.0004028   0.0002743   1.469  0.14346
## snow_in        0.0115073   0.0118299   0.973  0.33186
## precip_in     -0.0774247   0.0416193  -1.860  0.06430 .
## dplyr::lag(white_mh_incid_c, 1) 0.4580650   0.0696676   6.575 4.11e-10 ***
## dplyr::lag(white_mh_incid_c, 2) 0.1996833   0.0755440   2.643  0.00886 **
## dplyr::lag(white_mh_incid_c, 3) 0.1102985   0.0713478   1.546  0.12370
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0628 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.711, Adjusted R-squared:  0.6908
## F-statistic: 35.31 on 14 and 201 DF, p-value: < 2.2e-16
```

```
ts_ar3_black <- lm(black_mh_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(black_mh_incid_c, 1)+ dplyr::lag(black_mh_incid_c, 2)+
  dplyr::lag(black_mh_incid_c, 3),
  data = series)
summary(ts_ar3_black)
```

```
##
## Call:
## lm(formula = black_mh_incid_c ~ t + post_floyd + t_post_floyd +
##     state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##     tmax_f + snow_in + precip_in + dplyr::lag(black_mh_incid_c,
```

```
##      1) + dplyr::lag(black_mh_incid_c, 2) + dplyr::lag(black_mh_incid_c,
##      3), data = series)
##
## Residuals:
##      Min        1Q    Median        3Q        Max
## -0.36850 -0.09573  0.00568  0.08878  0.38651
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      0.0141863   0.0889070    0.160  0.87339
## t                0.0012463   0.0004333    2.877  0.00445 **
## post_floyd1      0.2275118   0.0944478    2.409  0.01690 *
## t_post_floyd    -0.0064742   0.0034013   -1.903  0.05841 .
## state_of_emerg1 -0.2777338   0.0884739   -3.139  0.00195 **
## stay_at_home1    0.1933975   0.0908916    2.128  0.03457 *
## uof_lag         0.1002663   0.2101135    0.477  0.63374
## stops_lag       0.0401415   0.0347963    1.154  0.25003
## shoot_lag       0.9357288   6.0406071    0.155  0.87705
## tmax_f          0.0002127   0.0006120    0.348  0.72850
## snow_in        -0.0015209   0.0262945   -0.058  0.95393
## precip_in      -0.1546230   0.0919942   -1.681  0.09436 .
## dplyr::lag(black_mh_incid_c, 1) 0.3404288   0.0687366    4.953 1.55e-06 ***
## dplyr::lag(black_mh_incid_c, 2) 0.1746462   0.0712275    2.452  0.01506 *
## dplyr::lag(black_mh_incid_c, 3) 0.2304896   0.0691261    3.334  0.00102 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1396 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.7485, Adjusted R-squared:  0.731
## F-statistic: 42.73 on 14 and 201 DF,  p-value: < 2.2e-16

ts_ar3_latin <- lm(latin_mh_incid_c~t+post_floyd+t_post_floyd+
                    state_of_emerg+stay_at_home+
                    uof_lag+stops_lag+shoot_lag+
                    tmax_f+snow_in+precip_in+
                    dplyr::lag(latin_mh_incid_c, 1)+ dplyr::lag(latin_mh_incid_c, 2)+
                    dplyr::lag(latin_mh_incid_c, 3),
                    data = series)
summary(ts_ar3_latin)

##
## Call:
## lm(formula = latin_mh_incid_c ~ t + post_floyd + t_post_floyd +
##      state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##      tmax_f + snow_in + precip_in + dplyr::lag(latin_mh_incid_c,
##      1) + dplyr::lag(latin_mh_incid_c, 2) + dplyr::lag(latin_mh_incid_c,
##      3), data = series)
##
## Residuals:
##      Min        1Q    Median        3Q        Max
## -0.32627 -0.08952 -0.00498  0.07227  0.46747
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      0.1212575   0.0888653    1.365  0.1739
## t                0.0015661   0.0003621    4.325  2.4e-05 ***
## post_floyd1      0.0220082   0.0922099    0.239  0.8116
## t_post_floyd    -0.0010224   0.0031846   -0.321  0.7485
## state_of_emerg1 -0.0957676   0.0853273   -1.122  0.2631
## stay_at_home1    -0.0254365   0.0884428   -0.288  0.7739
## uof_lag        -0.0604641   0.2052003   -0.295  0.7686
```

```
## stops_lag                0.0244754  0.0338034   0.724   0.4699
## shoot_lag                -0.7411583  5.9017391  -0.126   0.9002
## tmax_f                   0.0006496  0.0005993   1.084   0.2797
## snow_in                  -0.0166330  0.0258945  -0.642   0.5214
## precip_in                -0.0139139  0.0906619  -0.153   0.8782
## dplyr::lag(latin_mh_incid_c, 1) 0.0759002  0.0708414   1.071   0.2853
## dplyr::lag(latin_mh_incid_c, 2) 0.1220236  0.0705143   1.730   0.0851
## dplyr::lag(latin_mh_incid_c, 3) 0.1010719  0.0706985   1.430   0.1544
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Residual standard error: 0.1366 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.395, Adjusted R-squared:  0.3529
## F-statistic: 9.373 on 14 and 201 DF, p-value: 8.539e-16
```

```
ts_ar3_indig <- lm(indig_mh_incid_c~t+post_floyd+t_post_floyd+
                    state_of_emerg+stay_at_home+
                    uof_lag+stops_lag+shoot_lag+
                    tmax_f+snow_in+precip_in+
                    dplyr::lag(indig_mh_incid_c, 1)+ dplyr::lag(indig_mh_incid_c, 2)+
                    dplyr::lag(indig_mh_incid_c, 3),
                    data = series)
summary(ts_ar3_indig)
```

```
##
## Call:
## lm(formula = indig_mh_incid_c ~ t + post_floyd + t_post_floyd +
##     state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##     tmax_f + snow_in + precip_in + dplyr::lag(indig_mh_incid_c,
##     1) + dplyr::lag(indig_mh_incid_c, 2) + dplyr::lag(indig_mh_incid_c,
##     3), data = series)
```

```
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.94493 -0.48732 -0.03297  0.41472  2.16175
```

```
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.091617   0.511596   0.179 0.858055
## t              0.011116   0.002409   4.613 7.05e-06 ***
## post_floyd1    -0.005883   0.542891  -0.011 0.991364
## t_post_floyd  -0.028015   0.019477  -1.438 0.151886
## state_of_emerg1 -1.078173   0.512933  -2.102 0.036801 *
## stay_at_home1   0.615417   0.517587   1.189 0.235838
## uof_lag         1.068696   1.219766   0.876 0.381995
## stops_lag       0.129703   0.205592   0.631 0.528838
## shoot_lag      -20.852896  34.969339  -0.596 0.551633
## tmax_f          0.012843   0.003693   3.478 0.000619 ***
## snow_in        -0.097473   0.152010  -0.641 0.522102
## precip_in      -0.297496   0.534246  -0.557 0.578248
## dplyr::lag(indig_mh_incid_c, 1) 0.088732   0.070461   1.259 0.209381
## dplyr::lag(indig_mh_incid_c, 2) 0.003019   0.071388   0.042 0.966307
## dplyr::lag(indig_mh_incid_c, 3) 0.102202   0.070032   1.459 0.146026
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Residual standard error: 0.8054 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.4717, Adjusted R-squared:  0.4349
## F-statistic: 12.82 on 14 and 201 DF, p-value: < 2.2e-16
```

```
ts_ar3_asian <- lm(asian_mh_incid_c~t+post_floyd+t_post_floyd+
                  state_of_emerg+stay_at_home+
                  uof_lag+stops_lag+shoot_lag+
                  tmax_f+snow_in+precip_in+
                  dplyr::lag(asian_mh_incid_c, 1)+ dplyr::lag(asian_mh_incid_c, 2)+
                  dplyr::lag(asian_mh_incid_c, 3),
                  data = series)
summary(ts_ar3_asian)
```

```
##
## Call:
## lm(formula = asian_mh_incid_c ~ t + post_floyd + t_post_floyd +
##     state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##     tmax_f + snow_in + precip_in + dplyr::lag(asian_mh_incid_c,
##     1) + dplyr::lag(asian_mh_incid_c, 2) + dplyr::lag(asian_mh_incid_c,
##     3), data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.178998 -0.056140 -0.002342  0.054363  0.249322
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      0.0893138   0.0508908    1.755 0.080781 .
## t                0.0006955   0.0001904    3.652 0.000332 ***
## post_floyd1      0.0377839   0.0555733    0.680 0.497354
## t_post_floyd    -0.0011112   0.0018789   -0.591 0.554914
## state_of_emerg1 -0.1012373   0.0526218   -1.924 0.055784 .
## stay_at_home1    0.0830828   0.0526227    1.579 0.115945
## uof_lag          0.0032839   0.1202325    0.027 0.978238
## stops_lag       -0.0059968   0.0198598   -0.302 0.762996
## shoot_lag       -3.9811684   3.4672731   -1.148 0.252245
## tmax_f           0.0003519   0.0003468    1.015 0.311359
## snow_in          -0.0011587   0.0151301   -0.077 0.939033
## precip_in        -0.0309254   0.0528962   -0.585 0.559443
## dplyr::lag(asian_mh_incid_c, 1) 0.0299524   0.0713825    0.420 0.675223
## dplyr::lag(asian_mh_incid_c, 2) 0.0269270   0.0709786    0.379 0.704815
## dplyr::lag(asian_mh_incid_c, 3) -0.0795650   0.0714834   -1.113 0.267014
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.08022 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.1816, Adjusted R-squared:  0.1246
## F-statistic: 3.185 on 14 and 201 DF, p-value: 0.0001513
```

#### *#nonlinear specifications*

```
series <- series %>%
  mutate(t2 = t^2,
         t_post_floyd2 = t_post_floyd^2)

ts_ar3_nl<- lm(mh_incid_c~t+t2+post_floyd+t_post_floyd+t_post_floyd2+
              state_of_emerg+stay_at_home+
              uof_lag+stops_lag+shoot_lag+
              tmax_f+snow_in+precip_in+
              dplyr::lag(mh_incid_c, 1)+ dplyr::lag(mh_incid_c, 2)+
              dplyr::lag(mh_incid_c, 3),
              data = series)
summary(ts_ar3_nl)
```

```
##
```

```
## Call:
## lm(formula = mh_incid_c ~ t + t2 + post_floyd + t_post_floyd +
##      t_post_floyd2 + state_of_emerg + stay_at_home + uof_lag +
##      stops_lag + shoot_lag + tmax_f + snow_in + precip_in + dplyr::lag(mh_incid_c,
##      1) + dplyr::lag(mh_incid_c, 2) + dplyr::lag(mh_incid_c, 3),
##      data = series)
##
## Residuals:
##      Min        1Q    Median        3Q        Max
## -0.47541 -0.07342  0.00884  0.06813  0.43062
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      6.827e-01  1.751e-01   3.900 0.000131 ***
## t                3.399e-03  1.312e-03   2.591 0.010288 *
## t2              -1.310e-05  4.897e-06  -2.675 0.008087 **
## post_floyd1       1.154e-01  8.909e-02   1.295 0.196917
## t_post_floyd      9.361e-03  1.030e-02   0.909 0.364652
## t_post_floyd2    -5.747e-04  3.298e-04  -1.743 0.082941 .
## state_of_emerg1  -1.856e-01  8.268e-02  -2.244 0.025913 *
## stay_at_home1     8.364e-02  8.289e-02   1.009 0.314166
## uof_lag           4.308e-01  1.867e-01   2.307 0.022081 *
## stops_lag        -3.268e-02  3.116e-02  -1.049 0.295591
## shoot_lag        -9.654e+00  5.397e+00  -1.789 0.075151 .
## tmax_f            1.351e-03  5.717e-04   2.362 0.019133 *
## snow_in           2.839e-03  2.358e-02   0.120 0.904296
## precip_in        -2.215e-01  8.382e-02  -2.642 0.008886 **
## dplyr::lag(mh_incid_c, 1) 2.709e-01  6.955e-02   3.895 0.000134 ***
## dplyr::lag(mh_incid_c, 2) 2.251e-01  6.997e-02   3.217 0.001510 **
## dplyr::lag(mh_incid_c, 3) 1.006e-01  6.818e-02   1.475 0.141836
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1238 on 199 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.7368, Adjusted R-squared:  0.7156
## F-statistic: 34.82 on 16 and 199 DF,  p-value: < 2.2e-16

ts_ar3_white_nl <- lm(white_mh_incid_c~t+t2+post_floyd+t_post_floyd+t_post_floyd2+
                      state_of_emerg+stay_at_home+
                      uof_lag+stops_lag+shoot_lag+
                      tmax_f+snow_in+precip_in+
                      dplyr::lag(white_mh_incid_c, 1)+ dplyr::lag(white_mh_incid_c, 2)+
                      dplyr::lag(white_mh_incid_c, 3),
                      data = series)
summary(ts_ar3_white_nl)

##
## Call:
## lm(formula = white_mh_incid_c ~ t + t2 + post_floyd + t_post_floyd +
##      t_post_floyd2 + state_of_emerg + stay_at_home + uof_lag +
##      stops_lag + shoot_lag + tmax_f + snow_in + precip_in + dplyr::lag(white_mh_incid_c,
##      1) + dplyr::lag(white_mh_incid_c, 2) + dplyr::lag(white_mh_incid_c,
##      3), data = series)
##
## Residuals:
##      Min        1Q    Median        3Q        Max
## -0.174993 -0.036710 -0.001709  0.031147  0.143731
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      -5.458e-02  4.510e-02  -1.210 0.227588
```

```
## t                5.923e-03  1.085e-03   5.459 1.42e-07 ***
## t2               -1.767e-05  3.434e-06  -5.145 6.39e-07 ***
## post_floyd1      5.222e-02  4.205e-02   1.242 0.215689
## t_post_floyd     1.474e-02  4.981e-03   2.959 0.003459 **
## t_post_floyd2    -5.582e-04  1.573e-04  -3.549 0.000482 ***
## state_of_emerg1  -5.873e-02  3.861e-02  -1.521 0.129830
## stay_at_home1    2.957e-02  3.864e-02   0.765 0.445006
## uof_lag          2.030e-01  8.874e-02   2.288 0.023192 *
## stops_lag        2.197e-02  1.506e-02   1.459 0.146035
## shoot_lag        -1.940e+00  2.553e+00  -0.760 0.448174
## tmax_f           6.336e-05  2.617e-04   0.242 0.808928
## snow_in          2.366e-03  1.113e-02   0.213 0.831856
## precip_in        -4.227e-02  3.912e-02  -1.081 0.281224
## dplyr::lag(white_mh_incid_c, 1) 2.755e-01  7.241e-02   3.804 0.000189 ***
## dplyr::lag(white_mh_incid_c, 2) 7.103e-02  7.470e-02   0.951 0.342790
## dplyr::lag(white_mh_incid_c, 3) -4.469e-02  7.266e-02  -0.615 0.539191
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.05831 on 199 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.7533, Adjusted R-squared:  0.7334
## F-statistic: 37.97 on 16 and 199 DF, p-value: < 2.2e-16

ts_ar3_black_nl <- lm(black_mh_incid_c~t+t2+post_floyd+t_post_floyd+t_post_floyd2+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(black_mh_incid_c, 1)+ dplyr::lag(black_mh_incid_c, 2)+
  dplyr::lag(black_mh_incid_c, 3),
  data = series)
summary(ts_ar3_black_nl)

##
## Call:
## lm(formula = black_mh_incid_c ~ t + t2 + post_floyd + t_post_floyd +
##     t_post_floyd2 + state_of_emerg + stay_at_home + uof_lag +
##     stops_lag + shoot_lag + tmax_f + snow_in + precip_in + dplyr::lag(black_mh_incid_c,
##     1) + dplyr::lag(black_mh_incid_c, 2) + dplyr::lag(black_mh_incid_c,
##     3), data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.32508 -0.09485 -0.00057  0.09753  0.38489
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -3.230e-01  1.117e-01  -2.892  0.00426 **
## t              1.109e-02  2.187e-03   5.071 9.05e-07 ***
## t2            -3.165e-05  6.899e-06  -4.589 7.89e-06 ***
## post_floyd1    2.731e-01  9.690e-02   2.818  0.00532 **
## t_post_floyd  -3.480e-03  1.126e-02  -0.309  0.75759
## t_post_floyd2 -5.849e-05  3.581e-04  -0.163  0.87042
## state_of_emerg1 -1.892e-01  8.818e-02  -2.145  0.03314 *
## stay_at_home1  1.543e-01  9.012e-02   1.713  0.08835 .
## uof_lag        1.652e-01  2.012e-01   0.821  0.41252
## stops_lag      4.327e-02  3.350e-02   1.292  0.19791
## shoot_lag      3.359e+00  5.794e+00   0.580  0.56271
## tmax_f         -7.519e-05  5.962e-04  -0.126  0.89977
## snow_in        -1.629e-02  2.530e-02  -0.644  0.52035
## precip_in      -1.402e-01  8.817e-02  -1.590  0.11350
## dplyr::lag(black_mh_incid_c, 1) 2.219e-01  7.065e-02   3.141  0.00194 **
```



```
## dplyr::lag(black_mh_incid_c, 2) 7.291e-02 7.217e-02 1.010 0.31361
## dplyr::lag(black_mh_incid_c, 3) 1.208e-01 7.016e-02 1.722 0.08665 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1332 on 199 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.7731, Adjusted R-squared:  0.7549
## F-statistic: 42.38 on 16 and 199 DF, p-value: < 2.2e-16

ts_ar3_latin_nl <- lm(latin_mh_incid_c~t+t2+post_floyd+t_post_floyd+t_post_floyd2+
                      state_of_emerg+stay_at_home+
                      uof_lag+stops_lag+shoot_lag+
                      tmax_f+snow_in+precip_in+
                      dplyr::lag(latin_mh_incid_c, 1)+ dplyr::lag(latin_mh_incid_c, 2)+
                      dplyr::lag(latin_mh_incid_c, 3),
                      data = series)
summary(ts_ar3_latin_nl)
```

```
##
## Call:
## lm(formula = latin_mh_incid_c ~ t + t2 + post_floyd + t_post_floyd +
##     t_post_floyd2 + state_of_emerg + stay_at_home + uof_lag +
##     stops_lag + shoot_lag + tmax_f + snow_in + precip_in + dplyr::lag(latin_mh_incid_c,
##     1) + dplyr::lag(latin_mh_incid_c, 2) + dplyr::lag(latin_mh_incid_c,
##     3), data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.29797 -0.09411 -0.00448  0.07668  0.47725
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -4.160e-02  1.025e-01  -0.406  0.685399
## t              5.780e-03  1.463e-03   3.952  0.000108 ***
## t2            -1.496e-05  5.060e-06  -2.957  0.003481 **
## post_floyd1    1.662e-02  9.630e-02   0.173  0.863111
## t_post_floyd   9.788e-03  1.114e-02   0.879  0.380705
## t_post_floyd2 -2.629e-04  3.560e-04  -0.739  0.461056
## state_of_emerg1 -3.477e-02  8.883e-02  -0.391  0.695910
## stay_at_home1  -9.575e-03  8.919e-02  -0.107  0.914623
## uof_lag        -2.000e-02  2.021e-01  -0.099  0.921281
## stops_lag      2.169e-02  3.362e-02   0.645  0.519690
## shoot_lag      1.102e+00  5.831e+00   0.189  0.850282
## tmax_f         3.439e-04  6.019e-04   0.571  0.568370
## snow_in        -2.894e-02  2.578e-02  -1.122  0.263123
## precip_in      4.610e-03  8.945e-02   0.052  0.958943
## dplyr::lag(latin_mh_incid_c, 1) 2.670e-02  7.174e-02   0.372  0.710134
## dplyr::lag(latin_mh_incid_c, 2) 7.293e-02  7.137e-02   1.022  0.308031
## dplyr::lag(latin_mh_incid_c, 3) 6.325e-02  7.064e-02   0.895  0.371655
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1342 on 199 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.4218, Adjusted R-squared:  0.3753
## F-statistic: 9.073 on 16 and 199 DF, p-value: < 2.2e-16
```

```
ts_ar3_depress <- lm(depress_incid_c~t+post_floyd+t_post_floyd+
                     state_of_emerg+stay_at_home+
                     uof_lag+stops_lag+shoot_lag+
                     tmax_f+snow_in+precip_in+
```

```

        dplyr::lag(depress_incid_c, 1)+ dplyr::lag(depress_incid_c, 2)+
        dplyr::lag(depress_incid_c, 3),
        data = series)
summary(ts_ar3_depress)

```

```

##
## Call:
## lm(formula = depress_incid_c ~ t + post_floyd + t_post_floyd +
##      state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##      tmax_f + snow_in + precip_in + dplyr::lag(depress_incid_c,
##      1) + dplyr::lag(depress_incid_c, 2) + dplyr::lag(depress_incid_c,
##      3), data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.170939 -0.031407  0.003347  0.034761  0.125887
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      1.875e-01  6.206e-02   3.021  0.00284 **
## t                -8.618e-05  1.036e-04  -0.832  0.40648
## post_floyd1       7.703e-02  3.465e-02   2.223  0.02732 *
## t_post_floyd     -3.086e-03  1.193e-03  -2.587  0.01040 *
## state_of_emerg1   -9.204e-02  3.299e-02  -2.790  0.00578 **
## stay_at_home1     2.840e-02  3.343e-02   0.849  0.39671
## uof_lag           1.352e-01  7.708e-02   1.754  0.08100 .
## stops_lag        -9.201e-03  1.272e-02  -0.723  0.47044
## shoot_lag        -2.897e+00  2.207e+00  -1.313  0.19084
## tmax_f            4.572e-04  2.264e-04   2.019  0.04482 *
## snow_in           1.458e-02  9.578e-03   1.522  0.12952
## precip_in        -8.363e-02  3.405e-02  -2.456  0.01488 *
## dplyr::lag(depress_incid_c, 1)  3.093e-01  6.939e-02   4.458  1.37e-05 ***
## dplyr::lag(depress_incid_c, 2)  3.016e-01  6.982e-02   4.319  2.46e-05 ***
## dplyr::lag(depress_incid_c, 3)  1.121e-01  6.995e-02   1.602  0.11062
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.051 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.7322, Adjusted R-squared:  0.7136
## F-statistic: 39.26 on 14 and 201 DF, p-value: < 2.2e-16

```

#### *#race specific models*

```

ts_ar3_white_depress <- lm(white_depress_incid_c~t+post_floyd+t_post_floyd+
        state_of_emerg+stay_at_home+
        uof_lag+stops_lag+shoot_lag+
        tmax_f+snow_in+precip_in+
        dplyr::lag(white_depress_incid_c, 1)+
        dplyr::lag(white_depress_incid_c, 2)+
        dplyr::lag(white_depress_incid_c, 3),
        data = series)
summary(ts_ar3_white_depress)

```

```

##
## Call:
## lm(formula = white_depress_incid_c ~ t + post_floyd + t_post_floyd +
##      state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##      tmax_f + snow_in + precip_in + dplyr::lag(white_depress_incid_c,
##      1) + dplyr::lag(white_depress_incid_c, 2) + dplyr::lag(white_depress_incid_c,
##      3), data = series)
##

```

```
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.088067 -0.025814 -0.001183  0.025283  0.108248
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    4.996e-02  2.537e-02   1.969  0.05027 .
## t              2.155e-04  9.958e-05   2.164  0.03165 *
## post_floyd1    4.523e-02  2.491e-02   1.816  0.07087 .
## t_post_floyd  -1.884e-03  8.620e-04  -2.186  0.03000 *
## state_of_emerg1 -4.443e-02  2.370e-02  -1.875  0.06231 .
## stay_at_home1   7.916e-03  2.396e-02   0.330  0.74148
## uof_lag         8.161e-02  5.580e-02   1.462  0.14518
## stops_lag       5.163e-03  9.438e-03   0.547  0.58500
## shoot_lag      -3.774e+00  1.610e+00  -2.344  0.02007 *
## tmax_f          1.584e-04  1.604e-04   0.987  0.32462
## snow_in         1.230e-03  6.948e-03   0.177  0.85964
## precip_in      -2.764e-02  2.435e-02  -1.135  0.25759
## dplyr::lag(white_depress_incid_c, 1) 2.281e-01  7.108e-02   3.209  0.00155 **
## dplyr::lag(white_depress_incid_c, 2) 3.475e-01  6.858e-02   5.068  9.11e-07 ***
## dplyr::lag(white_depress_incid_c, 3) 6.553e-02  7.209e-02   0.909  0.36443
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.03683 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.5107, Adjusted R-squared:  0.4766
## F-statistic: 14.98 on 14 and 201 DF, p-value: < 2.2e-16

ts_ar3_black_depress <- lm(black_depress_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(black_depress_incid_c, 1)+
  dplyr::lag(black_depress_incid_c, 2)+
  dplyr::lag(black_depress_incid_c, 3),
  data = series)
summary(ts_ar3_black_depress)

##
## Call:
## lm(formula = black_depress_incid_c ~ t + post_floyd + t_post_floyd +
##      state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##      tmax_f + snow_in + precip_in + dplyr::lag(black_depress_incid_c,
##      1) + dplyr::lag(black_depress_incid_c, 2) + dplyr::lag(black_depress_incid_c,
##      3), data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.191576 -0.043293 -0.000113  0.042017  0.168964
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  -0.0114105  0.0445904  -0.256  0.79829
## t              0.0008146  0.0001970   4.136 5.20e-05 ***
## post_floyd1    0.0775444  0.0461906   1.679  0.09475 .
## t_post_floyd  -0.0033909  0.0016287  -2.082  0.03860 *
## state_of_emerg1 -0.1235478  0.0437579  -2.823  0.00523 **
## stay_at_home1   0.0434485  0.0443112   0.981  0.32800
## uof_lag         0.1090897  0.1023078   1.066  0.28757
## stops_lag       0.0271394  0.0168507   1.611  0.10884
## shoot_lag       5.5122542  2.9829859   1.848  0.06609 .
```

```
##   tmax_f           0.0001930  0.0002994  0.644  0.52006
##   snow_in          0.0059867  0.0128784  0.465  0.64253
##   precip_in        -0.0798836  0.0453400  -1.762  0.07961 .
##   dplyr::lag(black_depress_incid_c, 1)  0.3326423  0.0666875  4.988 1.32e-06 ***
##   dplyr::lag(black_depress_incid_c, 2) -0.0782465  0.0704290  -1.111  0.26790
##   dplyr::lag(black_depress_incid_c, 3)  0.2982869  0.0661849  4.507 1.12e-05 ***
##   ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06833 on 201 degrees of freedom
##   (44 observations deleted due to missingness)
## Multiple R-squared:  0.5996, Adjusted R-squared:  0.5717
## F-statistic: 21.5 on 14 and 201 DF, p-value: < 2.2e-16

ts_ar3_latin_depress <- lm(latin_depress_incid_c~t+post_floyd+t_post_floyd+
                           state_of_emerg+stay_at_home+
                           uof_lag+stops_lag+shoot_lag+
                           tmax_f+snow_in+precip_in+
                           dplyr::lag(latin_depress_incid_c, 1)+
                           dplyr::lag(latin_depress_incid_c, 2)+
                           dplyr::lag(latin_depress_incid_c, 3),
                           data = series)
summary(ts_ar3_latin_depress)

##
## Call:
## lm(formula = latin_depress_incid_c ~ t + post_floyd + t_post_floyd +
##     state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##     tmax_f + snow_in + precip_in + dplyr::lag(latin_depress_incid_c,
##     1) + dplyr::lag(latin_depress_incid_c, 2) + dplyr::lag(latin_depress_incid_c,
##     3), data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.142994 -0.046706 -0.006234  0.036413  0.263385
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -1.202e-02  4.471e-02  -0.269   0.7883
## t              9.260e-04  1.712e-04   5.409 1.79e-07 ***
## post_floyd1    -7.342e-03  4.773e-02  -0.154   0.8779
## t_post_floyd   2.347e-04  1.638e-03   0.143   0.8862
## state_of_emerg1 -5.743e-02  4.401e-02  -1.305   0.1933
## stay_at_home1   1.061e-04  4.521e-02   0.002   0.9981
## uof_lag        -1.365e-01  1.055e-01  -1.294   0.1973
## stops_lag       3.844e-02  1.757e-02   2.187   0.0299 *
## shoot_lag      -2.365e+00  3.043e+00  -0.777   0.4380
## tmax_f         -4.044e-05  3.068e-04  -0.132   0.8953
## snow_in        -5.806e-03  1.329e-02  -0.437   0.6627
## precip_in       8.526e-03  4.665e-02   0.183   0.8552
## dplyr::lag(latin_depress_incid_c, 1)  7.691e-02  7.029e-02   1.094   0.2752
## dplyr::lag(latin_depress_incid_c, 2) -2.290e-02  7.030e-02  -0.326   0.7450
## dplyr::lag(latin_depress_incid_c, 3) -1.482e-02  7.026e-02  -0.211   0.8332
##   ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.07042 on 201 degrees of freedom
##   (44 observations deleted due to missingness)
## Multiple R-squared:  0.237, Adjusted R-squared:  0.1839
## F-statistic: 4.46 on 14 and 201 DF, p-value: 5.949e-07
```

```
ts_ar3_anxiety <- lm(anxiety_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(anxiety_incid_c, 1)+ dplyr::lag(anxiety_incid_c, 2)+
  dplyr::lag(anxiety_incid_c, 3),
  data = series)
summary(ts_ar3_anxiety)
```

```
##
## Call:
## lm(formula = anxiety_incid_c ~ t + post_floyd + t_post_floyd +
##     state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##     tmax_f + snow_in + precip_in + dplyr::lag(anxiety_incid_c,
##     1) + dplyr::lag(anxiety_incid_c, 2) + dplyr::lag(anxiety_incid_c,
##     3), data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.198610 -0.026801 -0.000377  0.029594  0.159746
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    1.406e-01  5.694e-02   2.469  0.01440 *
## t              5.022e-05  9.884e-05   0.508  0.61198
## post_floyd1    7.120e-02  3.287e-02   2.166  0.03149 *
## t_post_floyd  -3.466e-03  1.142e-03  -3.036  0.00272 **
## state_of_emerg1 -6.611e-02  3.162e-02  -2.091  0.03777 *
## stay_at_home1   3.209e-02  3.163e-02   1.014  0.31157
## uof_lag         1.004e-01  7.305e-02   1.375  0.17062
## stops_lag      -3.886e-03  1.215e-02  -0.320  0.74941
## shoot_lag      -3.044e+00  2.110e+00  -1.443  0.15070
## tmax_f          3.770e-04  2.164e-04   1.742  0.08297 .
## snow_in         1.473e-02  9.159e-03   1.608  0.10939
## precip_in      -6.252e-02  3.245e-02  -1.927  0.05542 .
## dplyr::lag(anxiety_incid_c, 1)  3.204e-01  7.184e-02   4.461  1.36e-05 ***
## dplyr::lag(anxiety_incid_c, 2)  3.109e-01  7.341e-02   4.235  3.47e-05 ***
## dplyr::lag(anxiety_incid_c, 3)  1.100e-01  7.284e-02   1.510  0.13254
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.04867 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.5904, Adjusted R-squared:  0.5618
## F-statistic: 20.69 on 14 and 201 DF, p-value: < 2.2e-16
```

#### *#race specific models*

```
ts_ar3_white_anxiety <- lm(white_anxiety_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(white_anxiety_incid_c, 1)+
  dplyr::lag(white_anxiety_incid_c, 2)+
  dplyr::lag(white_anxiety_incid_c, 3),
  data = series)
summary(ts_ar3_white_anxiety)
```

```
##
## Call:
## lm(formula = white_anxiety_incid_c ~ t + post_floyd + t_post_floyd +
##     state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
```

```
##      tmax_f + snow_in + precip_in + dplyr::lag(white_anxiety_incid_c,
##      1) + dplyr::lag(white_anxiety_incid_c, 2) + dplyr::lag(white_anxiety_incid_c,
##      3), data = series)
##
## Residuals:
##      Min        1Q      Median        3Q        Max
## -0.088067 -0.025814 -0.001183  0.025283  0.108248
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      4.996e-02  2.537e-02   1.969  0.05027 .
## t                2.155e-04  9.958e-05   2.164  0.03165 *
## post_floyd1      4.523e-02  2.491e-02   1.816  0.07087 .
## t_post_floyd    -1.884e-03  8.620e-04  -2.186  0.03000 *
## state_of_emerg1 -4.443e-02  2.370e-02  -1.875  0.06231 .
## stay_at_home1    7.916e-03  2.396e-02   0.330  0.74148
## uof_lag          8.161e-02  5.580e-02   1.462  0.14518
## stops_lag        5.163e-03  9.438e-03   0.547  0.58500
## shoot_lag       -3.774e+00  1.610e+00  -2.344  0.02007 *
## tmax_f           1.584e-04  1.604e-04   0.987  0.32462
## snow_in          1.230e-03  6.948e-03   0.177  0.85964
## precip_in       -2.764e-02  2.435e-02  -1.135  0.25759
## dplyr::lag(white_anxiety_incid_c, 1)  2.281e-01  7.108e-02   3.209  0.00155 **
## dplyr::lag(white_anxiety_incid_c, 2)  3.475e-01  6.858e-02   5.068  9.11e-07 ***
## dplyr::lag(white_anxiety_incid_c, 3)  6.553e-02  7.209e-02   0.909  0.36443
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.03683 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.5107, Adjusted R-squared:  0.4766
## F-statistic: 14.98 on 14 and 201 DF, p-value: < 2.2e-16

ts_ar3_black_anxiety <- lm(black_anxiety_incid_c~t+post_floyd+t_post_floyd+
      state_of_emerg+stay_at_home+
      uof_lag+stops_lag+shoot_lag+
      tmax_f+snow_in+precip_in+
      dplyr::lag(black_anxiety_incid_c, 1)+
      dplyr::lag(black_anxiety_incid_c, 2)+
      dplyr::lag(black_anxiety_incid_c, 3),
      data = series)
summary(ts_ar3_black_anxiety)

##
## Call:
## lm(formula = black_anxiety_incid_c ~ t + post_floyd + t_post_floyd +
##      state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##      tmax_f + snow_in + precip_in + dplyr::lag(black_anxiety_incid_c,
##      1) + dplyr::lag(black_anxiety_incid_c, 2) + dplyr::lag(black_anxiety_incid_c,
##      3), data = series)
##
## Residuals:
##      Min        1Q      Median        3Q        Max
## -0.13630 -0.03192 -0.00217  0.03487  0.33683
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      0.0130214  0.0391574   0.333  0.7398
## t                0.0007311  0.0001710   4.276 2.94e-05 ***
## post_floyd1     -0.0100291  0.0411194  -0.244  0.8076
## t_post_floyd    -0.0029851  0.0014567  -2.049  0.0417 *
## state_of_emerg1 -0.0253157  0.0387402  -0.653  0.5142
```

```
## stay_at_home1 -0.0380491 0.0393229 -0.968 0.3344
## uof_lag -0.0333187 0.0924370 -0.360 0.7189
## stops_lag 0.0167197 0.0150646 1.110 0.2684
## shoot_lag 0.3889486 2.6429911 0.147 0.8832
## tmax_f 0.0004335 0.0002683 1.616 0.1076
## snow_in 0.0174017 0.0115438 1.507 0.1333
## precip_in -0.0972048 0.0402829 -2.413 0.0167 *
## dplyr::lag(black_anxiety_incid_c, 1) 0.1673296 0.0689527 2.427 0.0161 *
## dplyr::lag(black_anxiety_incid_c, 2) 0.1020719 0.0697299 1.464 0.1448
## dplyr::lag(black_anxiety_incid_c, 3) 0.1472792 0.0709152 2.077 0.0391 *
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06109 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared: 0.4802, Adjusted R-squared: 0.444
## F-statistic: 13.26 on 14 and 201 DF, p-value: < 2.2e-16

ts_ar3_latin_anxiety <- lm(latin_anxiety_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(latin_anxiety_incid_c, 1)+
  dplyr::lag(latin_anxiety_incid_c, 2)+
  dplyr::lag(latin_anxiety_incid_c, 3),
  data = series)
summary(ts_ar3_latin_anxiety)

##
## Call:
## lm(formula = latin_anxiety_incid_c ~ t + post_floyd + t_post_floyd +
## state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
## tmax_f + snow_in + precip_in + dplyr::lag(latin_anxiety_incid_c,
## 1) + dplyr::lag(latin_anxiety_incid_c, 2) + dplyr::lag(latin_anxiety_incid_c,
## 3), data = series)
##
## Residuals:
## Min 1Q Median 3Q Max
## -0.16474 -0.04650 -0.00642 0.04834 0.16721
##
## Coefficients:
## Estimate Std. Error t value Pr(>|t|)
## (Intercept) 0.0603196 0.0449105 1.343 0.180752
## t 0.0005739 0.0001620 3.542 0.000494 ***
## post_floyd1 0.0557810 0.0475050 1.174 0.241699
## t_post_floyd -0.0028021 0.0016558 -1.692 0.092140 .
## state_of_emerg1 -0.0336284 0.0438467 -0.767 0.444009
## stay_at_home1 0.0231913 0.0454712 0.510 0.610596
## uof_lag 0.0342988 0.1063565 0.322 0.747418
## stops_lag 0.0045326 0.0174409 0.260 0.795221
## shoot_lag -1.1820945 3.0608906 -0.386 0.699762
## tmax_f 0.0004594 0.0003146 1.460 0.145813
## snow_in -0.0027626 0.0132833 -0.208 0.835457
## precip_in -0.0331290 0.0466370 -0.710 0.478305
## dplyr::lag(latin_anxiety_incid_c, 1) -0.0086072 0.0715245 -0.120 0.904335
## dplyr::lag(latin_anxiety_incid_c, 2) 0.1316800 0.0715018 1.842 0.067003 .
## dplyr::lag(latin_anxiety_incid_c, 3) -0.0404572 0.0710105 -0.570 0.569493
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.07044 on 201 degrees of freedom
## (44 observations deleted due to missingness)
```



```
## Multiple R-squared:  0.2389, Adjusted R-squared:  0.1859
## F-statistic: 4.507 on 14 and 201 DF,  p-value: 4.829e-07

ts_ar3_alcohol <- lm(etoh_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(etoh_incid_c, 1)+ dplyr::lag(etoh_incid_c, 2)+
  dplyr::lag(etoh_incid_c, 3),
  data = series)
summary(ts_ar3_alcohol)
```

```
##
## Call:
## lm(formula = etoh_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##     stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##     snow_in + precip_in + dplyr::lag(etoh_incid_c, 1) + dplyr::lag(etoh_incid_c,
##     2) + dplyr::lag(etoh_incid_c, 3), data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.13683 -0.03613 -0.00765  0.03989  0.18288
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    4.412e-01  7.252e-02   6.083 5.84e-09 ***
## t              -9.661e-05  1.225e-04  -0.789  0.43109
## post_floyd1     2.606e-02  4.101e-02   0.635  0.52585
## t_post_floyd   -4.307e-03  1.476e-03  -2.919  0.00392 **
## state_of_emerg1 -5.835e-02  3.835e-02  -1.522  0.12968
## stay_at_home1   4.886e-03  3.917e-02   0.125  0.90085
## uof_lag         7.629e-02  9.200e-02   0.829  0.40796
## stops_lag       1.546e-02  1.539e-02   1.004  0.31655
## shoot_lag      -2.966e+00  2.634e+00  -1.126  0.26153
## tmax_f          1.243e-03  2.983e-04   4.166 4.60e-05 ***
## snow_in         2.389e-03  1.158e-02   0.206  0.83674
## precip_in      -8.794e-02  4.090e-02  -2.150  0.03276 *
## dplyr::lag(etoh_incid_c, 1) 2.143e-01  7.198e-02   2.977  0.00326 **
## dplyr::lag(etoh_incid_c, 2) -2.597e-02  7.114e-02  -0.365  0.71546
## dplyr::lag(etoh_incid_c, 3) 5.934e-02  7.047e-02   0.842  0.40076
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06079 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.5789, Adjusted R-squared:  0.5496
## F-statistic: 19.74 on 14 and 201 DF,  p-value: < 2.2e-16
```

#### *#race specific models*

```
ts_ar3_white_alcohol <- lm(white_etoh_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(white_etoh_incid_c, 1)+
  dplyr::lag(white_etoh_incid_c, 2)+
  dplyr::lag(white_etoh_incid_c, 3),
  data = series)
summary(ts_ar3_white_alcohol)
```

```
##
## Call:
## lm(formula = white_etoh_incid_c ~ t + post_floyd + t_post_floyd +
```

```
##      state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##      tmax_f + snow_in + precip_in + dplyr::lag(white_eto_h_incid_c,
##      1) + dplyr::lag(white_eto_h_incid_c, 2) + dplyr::lag(white_eto_h_incid_c,
##      3), data = series)
##
## Residuals:
##      Min        1Q      Median        3Q        Max
## -0.059567 -0.018510 -0.001218  0.016913  0.075731
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      -9.434e-04  1.740e-02  -0.054  0.956815
## t                2.670e-04  8.171e-05   3.268  0.001274 **
## post_floyd1      -6.308e-03  1.849e-02  -0.341  0.733374
## t_post_floyd     -1.345e-03  6.520e-04  -2.063  0.040414 *
## state_of_emerg1   3.731e-03  1.752e-02   0.213  0.831572
## stay_at_home1    -1.705e-02  1.758e-02  -0.970  0.333249
## uof_lag          1.387e-02  4.104e-02   0.338  0.735711
## stops_lag        9.732e-03  6.857e-03   1.419  0.157368
## shoot_lag        1.831e-01  1.185e+00   0.154  0.877424
## tmax_f           1.796e-04  1.238e-04   1.451  0.148442
## snow_in          5.142e-03  5.160e-03   0.996  0.320231
## precip_in       -1.440e-02  1.809e-02  -0.796  0.426927
## dplyr::lag(white_eto_h_incid_c, 1)  1.330e-01  6.971e-02   1.908  0.057847 .
## dplyr::lag(white_eto_h_incid_c, 2)  2.359e-01  6.911e-02   3.413  0.000778 ***
## dplyr::lag(white_eto_h_incid_c, 3)  2.134e-01  7.044e-02   3.030  0.002764 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.02737 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.5752, Adjusted R-squared:  0.5456
## F-statistic: 19.44 on 14 and 201 DF,  p-value: < 2.2e-16

ts_ar3_black_alcohol <- lm(black_eto_h_incid_c~t+post_floyd+t_post_floyd+
      state_of_emerg+stay_at_home+
      uof_lag+stops_lag+shoot_lag+
      tmax_f+snow_in+precip_in+
      dplyr::lag(black_eto_h_incid_c, 1)+
      dplyr::lag(black_eto_h_incid_c, 2)+
      dplyr::lag(black_eto_h_incid_c, 3),
      data = series)
summary(ts_ar3_black_alcohol)

##
## Call:
## lm(formula = black_eto_h_incid_c ~ t + post_floyd + t_post_floyd +
##      state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##      tmax_f + snow_in + precip_in + dplyr::lag(black_eto_h_incid_c,
##      1) + dplyr::lag(black_eto_h_incid_c, 2) + dplyr::lag(black_eto_h_incid_c,
##      3), data = series)
##
## Residuals:
##      Min        1Q      Median        3Q        Max
## -0.155038 -0.042176 -0.006246  0.035819  0.238092
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.0067357  0.0407533   0.165  0.868889
## t              0.0005266  0.0001701   3.096  0.002242 **
## post_floyd1    0.0399508  0.0436133   0.916  0.360752
## t_post_floyd  -0.0025876  0.0015525  -1.667  0.097127 .
```

```
## state_of_emerg1          -0.0580507  0.0405188  -1.433  0.153501
## stay_at_home1           0.0181548  0.0417928   0.434  0.664464
## uof_lag                  -0.0448828  0.0970721  -0.462  0.644320
## stops_lag                0.0060299  0.0159972   0.377  0.706619
## shoot_lag               1.5542259  2.7904382   0.557  0.578159
## tmax_f                   0.0004590  0.0002871   1.599  0.111357
## snow_in                  0.0090425  0.0122136   0.740  0.459942
## precip_in               -0.0496496  0.0435108  -1.141  0.255192
## dplyr::lag(black_etch_incid_c, 1) 0.2432167  0.0719905   3.378  0.000875 ***
## dplyr::lag(black_etch_incid_c, 2) 0.2829043  0.0708892   3.991  9.22e-05 ***
## dplyr::lag(black_etch_incid_c, 3) 0.0204253  0.0711162   0.287  0.774247
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06452 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.5168, Adjusted R-squared:  0.4831
## F-statistic: 15.35 on 14 and 201 DF, p-value: < 2.2e-16

ts_ar3_latin_alcohol <- lm(latin_etch_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(latin_etch_incid_c, 1)+
  dplyr::lag(latin_etch_incid_c, 2)+
  dplyr::lag(latin_etch_incid_c, 3),
  data = series)
summary(ts_ar3_latin_alcohol)

##
## Call:
## lm(formula = latin_etch_incid_c ~ t + post_floyd + t_post_floyd +
##     state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##     tmax_f + snow_in + precip_in + dplyr::lag(latin_etch_incid_c,
##     1) + dplyr::lag(latin_etch_incid_c, 2) + dplyr::lag(latin_etch_incid_c,
##     3), data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.14057 -0.04365 -0.00399  0.03660  0.22111
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   0.0451245  0.0434501   1.039   0.300
## t              0.0006139  0.0001507   4.074 6.64e-05 ***
## post_floyd1    0.0581419  0.0456615   1.273   0.204
## t_post_floyd  -0.0002366  0.0015764  -0.150   0.881
## state_of_emerg1 -0.0538011  0.0421674  -1.276   0.203
## stay_at_home1   0.0250351  0.0436223   0.574   0.567
## uof_lag        -0.1014732  0.1020721  -0.994   0.321
## stops_lag       0.0164594  0.0166751   0.987   0.325
## shoot_lag      -1.6360473  2.9215764  -0.560   0.576
## tmax_f          0.0003923  0.0002950   1.330   0.185
## snow_in        -0.0122600  0.0128358  -0.955   0.341
## precip_in       0.0076312  0.0446125   0.171   0.864
## dplyr::lag(latin_etch_incid_c, 1) 0.0035137  0.0699893   0.050   0.960
## dplyr::lag(latin_etch_incid_c, 2) -0.0783780  0.0709468  -1.105   0.271
## dplyr::lag(latin_etch_incid_c, 3) 0.0228588  0.0707925   0.323   0.747
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06758 on 201 degrees of freedom
```

```
## (44 observations deleted due to missingness)
## Multiple R-squared: 0.2092, Adjusted R-squared: 0.1541
## F-statistic: 3.799 on 14 and 201 DF, p-value: 1.063e-05

ts_ar3_chronic <- lm(chronic_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(chronic_incid_c, 1)+ dplyr::lag(chronic_incid_c, 2)+
  dplyr::lag(chronic_incid_c, 3),
  data = series)
summary(ts_ar3_chronic)
```

```
##
## Call:
## lm(formula = chronic_incid_c ~ t + post_floyd + t_post_floyd +
##     state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##     tmax_f + snow_in + precip_in + dplyr::lag(chronic_incid_c,
##     1) + dplyr::lag(chronic_incid_c, 2) + dplyr::lag(chronic_incid_c,
##     3), data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.0090652 -0.0026645 -0.0003247  0.0022332  0.0114546
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -2.697e-05  2.366e-03  -0.011  0.9909
## t              1.969e-05  7.860e-06   2.505  0.0130 *
## post_floyd1    3.904e-03  2.520e-03   1.549  0.1229
## t_post_floyd  -1.267e-04  8.712e-05  -1.454  0.1475
## state_of_emerg1 -9.846e-04  2.319e-03  -0.425  0.6716
## stay_at_home1   8.661e-04  2.399e-03   0.361  0.7184
## uof_lag         2.784e-03  5.589e-03   0.498  0.6190
## stops_lag       7.878e-04  9.222e-04   0.854  0.3939
## shoot_lag       2.895e-01  1.625e-01   1.781  0.0764 .
## tmax_f          1.308e-05  1.624e-05   0.805  0.4216
## snow_in         3.447e-04  7.017e-04   0.491  0.6238
## precip_in      -2.616e-04  2.466e-03  -0.106  0.9156
## dplyr::lag(chronic_incid_c, 1) -3.631e-02  7.066e-02  -0.514  0.6079
## dplyr::lag(chronic_incid_c, 2)  9.625e-02  7.043e-02   1.366  0.1733
## dplyr::lag(chronic_incid_c, 3) -5.045e-02  7.032e-02  -0.718  0.4739
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.003733 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared: 0.1391, Adjusted R-squared: 0.0791
## F-statistic: 2.319 on 14 and 201 DF, p-value: 0.005584
```

#### *#race specific models*

```
ts_ar3_white_chronic <- lm(white_chronic_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(white_chronic_incid_c, 1)+
  dplyr::lag(white_chronic_incid_c, 2)+
  dplyr::lag(white_chronic_incid_c, 3),
  data = series)
summary(ts_ar3_white_chronic)
```

```
##
```

```
## Call:
## lm(formula = white_chronic_incid_c ~ t + post_floyd + t_post_floyd +
##      state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##      tmax_f + snow_in + precip_in + dplyr::lag(white_chronic_incid_c,
##      1) + dplyr::lag(white_chronic_incid_c, 2) + dplyr::lag(white_chronic_incid_c,
##      3), data = series)
##
## Residuals:
##      Min        1Q      Median        3Q        Max
## -0.0028510 -0.0017698 -0.0007917  0.0014869  0.0081485
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      3.791e-03  1.499e-03   2.529  0.0122 *
## t               -7.893e-07  4.743e-06  -0.166  0.8680
## post_floyd1     -4.492e-04  1.584e-03  -0.284  0.7771
## t_post_floyd     8.848e-06  5.467e-05   0.162  0.8716
## state_of_emerg1  -5.769e-04  1.464e-03  -0.394  0.6939
## stay_at_home1    2.281e-03  1.523e-03   1.498  0.1358
## uof_lag         -6.630e-03  3.522e-03  -1.882  0.0612 .
## stops_lag       -8.783e-04  5.815e-04  -1.510  0.1325
## shoot_lag       -4.144e-02  1.021e-01  -0.406  0.6852
## tmax_f          1.835e-05  1.020e-05   1.800  0.0734 .
## snow_in         -2.933e-04  4.417e-04  -0.664  0.5075
## precip_in       -2.154e-03  1.555e-03  -1.385  0.1677
## dplyr::lag(white_chronic_incid_c, 1) -3.390e-02  6.856e-02  -0.494  0.6216
## dplyr::lag(white_chronic_incid_c, 2) -1.875e-02  6.821e-02  -0.275  0.7837
## dplyr::lag(white_chronic_incid_c, 3) -1.487e-01  6.816e-02  -2.181  0.0303 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.00235 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.1008, Adjusted R-squared:  0.03814
## F-statistic: 1.609 on 14 and 201 DF,  p-value: 0.07906

ts_ar3_black_chronic <- lm(black_chronic_incid_c~t+post_floyd+t_post_floyd+
      state_of_emerg+stay_at_home+
      uof_lag+stops_lag+shoot_lag+
      tmax_f+snow_in+precip_in+
      dplyr::lag(black_chronic_incid_c, 1)+
      dplyr::lag(black_chronic_incid_c, 2)+
      dplyr::lag(black_chronic_incid_c, 3),
      data = series)
summary(ts_ar3_black_chronic)

##
## Call:
## lm(formula = black_chronic_incid_c ~ t + post_floyd + t_post_floyd +
##      state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##      tmax_f + snow_in + precip_in + dplyr::lag(black_chronic_incid_c,
##      1) + dplyr::lag(black_chronic_incid_c, 2) + dplyr::lag(black_chronic_incid_c,
##      3), data = series)
##
## Residuals:
##      Min        1Q      Median        3Q        Max
## -0.010016 -0.006253 -0.002819  0.005235  0.028319
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      1.378e-02  5.273e-03   2.612  0.00967 **
## t               -4.750e-06  1.665e-05  -0.285  0.77572
```

```
## post_floyd1 -1.572e-03 5.567e-03 -0.282 0.77788
## t_post_floyd 3.282e-05 1.921e-04 0.171 0.86450
## state_of_emerg1 -1.927e-03 5.143e-03 -0.375 0.70831
## stay_at_home1 8.036e-03 5.352e-03 1.501 0.13480
## uof_lag -2.338e-02 1.238e-02 -1.889 0.06030 .
## stops_lag -3.150e-03 2.043e-03 -1.541 0.12477
## shoot_lag -1.504e-01 3.587e-01 -0.419 0.67546
## tmax_f 6.369e-05 3.581e-05 1.778 0.07685 .
## snow_in -1.059e-03 1.552e-03 -0.682 0.49581
## precip_in -7.512e-03 5.464e-03 -1.375 0.17076
## dplyr::lag(black_chronic_incid_c, 1) -3.302e-02 6.856e-02 -0.482 0.63061
## dplyr::lag(black_chronic_incid_c, 2) -2.113e-02 6.819e-02 -0.310 0.75699
## dplyr::lag(black_chronic_incid_c, 3) -1.483e-01 6.814e-02 -2.177 0.03068 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.008256 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.09985, Adjusted R-squared:  0.03716
## F-statistic: 1.593 on 14 and 201 DF, p-value: 0.08355

ts_ar3_latin_chronic <- lm(latin_chronic_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(latin_chronic_incid_c, 1)+
  dplyr::lag(latin_chronic_incid_c, 2)+
  dplyr::lag(latin_chronic_incid_c, 3),
  data = series)
summary(ts_ar3_latin_chronic)

##
## Call:
## lm(formula = latin_chronic_incid_c ~ t + post_floyd + t_post_floyd +
## state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
## tmax_f + snow_in + precip_in + dplyr::lag(latin_chronic_incid_c,
## 1) + dplyr::lag(latin_chronic_incid_c, 2) + dplyr::lag(latin_chronic_incid_c,
## 3), data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.010259 -0.002312 -0.001323 -0.000128  0.039785
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -2.976e-03  4.090e-03  -0.728  0.4676
## t            1.935e-05  1.304e-05   1.484  0.1393
## post_floyd1 -7.431e-03  4.423e-03  -1.680  0.0944 .
## t_post_floyd 1.151e-04  1.522e-04   0.756  0.4503
## state_of_emerg1 8.976e-03  4.144e-03   2.166  0.0315 *
## stay_at_home1 -5.298e-03  4.239e-03  -1.250  0.2128
## uof_lag -1.001e-02  9.719e-03  -1.030  0.3043
## stops_lag 1.223e-03  1.588e-03   0.770  0.4422
## shoot_lag 1.086e-01  2.785e-01   0.390  0.6970
## tmax_f 1.601e-07  2.852e-05   0.006  0.9955
## snow_in -1.394e-03  1.228e-03  -1.136  0.2575
## precip_in 6.058e-03  4.329e-03   1.399  0.1632
## dplyr::lag(latin_chronic_incid_c, 1) -1.034e-01  7.101e-02  -1.457  0.1468
## dplyr::lag(latin_chronic_incid_c, 2) -4.220e-02  7.302e-02  -0.578  0.5640
## dplyr::lag(latin_chronic_incid_c, 3) -2.490e-02  7.455e-02  -0.334  0.7387
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Residual standard error: 0.006444 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared: 0.1075, Adjusted R-squared: 0.04535
## F-statistic: 1.729 on 14 and 201 DF, p-value: 0.05212

ts_ar3_acute <- lm(acute_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(acute_incid_c, 1)+ dplyr::lag(acute_incid_c, 2)+
  dplyr::lag(acute_incid_c, 3),
  data = series)
summary(ts_ar3_acute)
```

```
##
## Call:
## lm(formula = acute_incid_c ~ t + post_floyd + t_post_floyd +
##     state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##     tmax_f + snow_in + precip_in + dplyr::lag(acute_incid_c,
##     1) + dplyr::lag(acute_incid_c, 2) + dplyr::lag(acute_incid_c,
##     3), data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.0080258 -0.0027718 -0.0004037  0.0023630  0.0114413
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    9.627e-03  2.641e-03   3.646  0.00034 ***
## t             -4.762e-06  7.919e-06  -0.601  0.54827
## post_floyd1    2.278e-03  2.650e-03   0.860  0.39103
## t_post_floyd  -1.508e-04  9.207e-05  -1.638  0.10303
## state_of_emerg1 1.040e-03  2.460e-03   0.423  0.67285
## stay_at_home1  -3.134e-03  2.573e-03  -1.218  0.22468
## uof_lag        -1.052e-03  5.882e-03  -0.179  0.85826
## stops_lag      -8.452e-04  9.708e-04  -0.871  0.38502
## shoot_lag      -1.554e-02  1.706e-01  -0.091  0.92755
## tmax_f         -5.478e-06  1.729e-05  -0.317  0.75168
## snow_in        -3.204e-04  7.536e-04  -0.425  0.67121
## precip_in      5.745e-04  2.627e-03   0.219  0.82709
## dplyr::lag(acute_incid_c, 1) -5.324e-02  7.057e-02  -0.754  0.45146
## dplyr::lag(acute_incid_c, 2)  5.179e-02  7.156e-02   0.724  0.47011
## dplyr::lag(acute_incid_c, 3)  9.002e-02  7.076e-02   1.272  0.20479
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.00393 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared: 0.06648, Adjusted R-squared: 0.001458
## F-statistic: 1.022 on 14 and 201 DF, p-value: 0.4324
```

#### *#race specific models*

```
ts_ar3_white_acute <- lm(white_acute_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(white_acute_incid_c, 1)+
  dplyr::lag(white_acute_incid_c, 2)+
  dplyr::lag(white_acute_incid_c, 3),
  data = series)
```



```
summary(ts_ar3_white_acute)
```

```
##
## Call:
## lm(formula = white_acute_incid_c ~ t + post_floyd + t_post_floyd +
##     state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##     tmax_f + snow_in + precip_in + dplyr::lag(white_acute_incid_c,
##     1) + dplyr::lag(white_acute_incid_c, 2) + dplyr::lag(white_acute_incid_c,
##     3), data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.0040285 -0.0010528 -0.0003499  0.0004504  0.0069079
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    1.550e-03   1.193e-03   1.299 0.195441
## t              7.358e-06   3.870e-06   1.901 0.058706 .
## post_floyd1    -2.944e-03   1.266e-03  -2.326 0.021027 *
## t_post_floyd    4.460e-06   4.368e-05   0.102 0.918775
## state_of_emerg1  3.504e-03   1.168e-03   3.000 0.003037 **
## stay_at_home1   -4.573e-03   1.204e-03  -3.797 0.000194 ***
## uof_lag         -3.564e-03   2.840e-03  -1.255 0.210880
## stops_lag       -5.922e-04   4.673e-04  -1.267 0.206494
## shoot_lag        9.225e-02   8.113e-02   1.137 0.256885
## tmax_f          -6.643e-06   8.089e-06  -0.821 0.412489
## snow_in         -6.031e-04   3.635e-04  -1.659 0.098618 .
## precip_in        8.106e-04   1.236e-03   0.656 0.512660
## dplyr::lag(white_acute_incid_c, 1)  1.861e-02   6.822e-02   0.273 0.785308
## dplyr::lag(white_acute_incid_c, 2)  1.170e-01   6.851e-02   1.707 0.089292 .
## dplyr::lag(white_acute_incid_c, 3) -8.257e-02   6.881e-02  -1.200 0.231535
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.00187 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.2658, Adjusted R-squared:  0.2146
## F-statistic: 5.196 on 14 and 201 DF, p-value: 2.417e-08
```

```
ts_ar3_black_acute <- lm(black_acute_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(black_acute_incid_c, 1)+
  dplyr::lag(black_acute_incid_c, 2)+
  dplyr::lag(black_acute_incid_c, 3),
  data = series)
summary(ts_ar3_black_acute)
```

```
##
## Call:
## lm(formula = black_acute_incid_c ~ t + post_floyd + t_post_floyd +
##     state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##     tmax_f + snow_in + precip_in + dplyr::lag(black_acute_incid_c,
##     1) + dplyr::lag(black_acute_incid_c, 2) + dplyr::lag(black_acute_incid_c,
##     3), data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.014139 -0.003697 -0.001236  0.001561  0.024217
##
## Coefficients:
```

```
##                                Estimate Std. Error t value Pr(>|t|)
## (Intercept)                   5.417e-03  4.181e-03    1.296 0.196566
## t                             2.565e-05  1.355e-05    1.893 0.059767 .
## post_floyd1                   -1.029e-02  4.435e-03   -2.321 0.021306 *
## t_post_floyd                  1.529e-05  1.531e-04    0.100 0.920496
## state_of_emerg1               1.231e-02  4.092e-03    3.007 0.002973 **
## stay_at_home1                 -1.603e-02  4.220e-03   -3.799 0.000193 ***
## uof_lag                       -1.246e-02  9.950e-03   -1.252 0.211945
## stops_lag                     -2.052e-03  1.637e-03   -1.253 0.211495
## shoot_lag                     3.226e-01  2.843e-01    1.135 0.257721
## tmax_f                        -2.380e-05  2.834e-05   -0.840 0.402058
## snow_in                       -2.118e-03  1.274e-03   -1.663 0.097800 .
## precip_in                     2.946e-03  4.330e-03    0.680 0.496992
## dplyr::lag(black_acute_incid_c, 1) 1.919e-02  6.822e-02    0.281 0.778741
## dplyr::lag(black_acute_incid_c, 2) 1.166e-01  6.851e-02    1.702 0.090390 .
## dplyr::lag(black_acute_incid_c, 3) -8.210e-02  6.877e-02   -1.194 0.233983
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.006553 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.2654, Adjusted R-squared:  0.2143
## F-statistic: 5.188 on 14 and 201 DF, p-value: 2.509e-08

ts_ar3_latin_acute <- lm(latin_acute_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  dplyr::lag(latin_acute_incid_c, 1)+
  dplyr::lag(latin_acute_incid_c, 2)+
  dplyr::lag(latin_acute_incid_c, 3),
  data = series)
summary(ts_ar3_latin_acute)

##
## Call:
## lm(formula = latin_acute_incid_c ~ t + post_floyd + t_post_floyd +
##     state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##     tmax_f + snow_in + precip_in + dplyr::lag(latin_acute_incid_c,
##     1) + dplyr::lag(latin_acute_incid_c, 2) + dplyr::lag(latin_acute_incid_c,
##     3), data = series)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.008256 -0.005135 -0.003920 -0.001454  0.083608
##
## Coefficients:
##                                Estimate Std. Error t value Pr(>|t|)
## (Intercept)                   3.435e-03  7.186e-03    0.478  0.6332
## t                             1.894e-05  2.299e-05    0.824  0.4110
## post_floyd1                   1.737e-03  7.610e-03    0.228  0.8197
## t_post_floyd                  4.136e-05  2.640e-04    0.157  0.8757
## state_of_emerg1               -1.274e-03  7.014e-03   -0.182  0.8560
## stay_at_home1                 3.919e-04  7.242e-03    0.054  0.9569
## uof_lag                       -1.799e-02  1.700e-02   -1.058  0.2914
## stops_lag                     2.343e-04  2.812e-03    0.083  0.9337
## shoot_lag                     -3.592e-01  4.864e-01   -0.738  0.4611
## tmax_f                        9.775e-07  4.867e-05    0.020  0.9840
## snow_in                       -7.793e-04  2.140e-03   -0.364  0.7162
## precip_in                     -1.495e-03  7.431e-03   -0.201  0.8408
## dplyr::lag(latin_acute_incid_c, 1) -1.245e-01  7.117e-02   -1.750  0.0817 .
## dplyr::lag(latin_acute_incid_c, 2) -8.066e-02  7.123e-02   -1.132  0.2588
```

```
## dplyr::lag(latin_acute_incid_c, 3) 4.868e-03 7.259e-02 0.067 0.9466
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.01126 on 201 degrees of freedom
## (44 observations deleted due to missingness)
## Multiple R-squared:  0.03482,    Adjusted R-squared:  -0.0324
## F-statistic: 0.518 on 14 and 201 DF,  p-value: 0.921

stargazer(ts_ar3, ts_ar3_white, ts_ar3_black, ts_ar3_latin,
  title = "Interrupted Time Series Models of Mental Health Diagnoses, Minneapolis 2016-2020",
  covariate.labels = c("T",
    "Post-Killing", "T Post-Killing",
    "COVID - State of Emerg.", "COVID - Stay at Home",
    "MPD Use of Force t-1", "MPD Stops t-1",
    "MPD OIS t-1",
    "Mean Max. Temp.", "Snow (in.)", "Precip. (in.)",
    "AR(1) Overall", "AR(2) Overall", "AR(3) Overall",
    "AR(1) White", "AR(2) White", "AR(3) White",
    "AR(1) Black", "AR(2) Black", "AR(3) Black",
    "AR(1) Latine", "AR(2) Latine", "AR(3) Latine"),
  dep.var.caption = "Mental Health Diagnoses/1,000",
  dep.var.labels.include = FALSE,
  column.labels = c("Overall", "White", "Black", "Latine"),
  model.numbers = TRUE,
  single.row = FALSE,
  align = T,
  omit.stat = c("adj.rsq", "f"),
  font.size="footnotesize", no.space = T, column.sep.width = "1pt",
  #star.cutoffs = c(.05, .01, .001), star.char = c("","**","***"),
  report = "vcs",
  ci=TRUE,
  ci.level=0.95,
  ci.separator = "|",
  notes = "95\\% Confidence Intervals in parentheses",
  header = F,
  notes.append = F)
```

## ZCTA-Week Level Analysis

### Panel Analysis

```
panel <- panel %>%
  mutate(black_pop_center = scale(black_pop, center = T, scale = T),
    post_floyd = as.factor(post_floyd),
    stay_at_home = as.factor(stay_at_home),
    state_of_emerg = as.factor(state_of_emerg),
    mh_incid_c = (mh_all_tot/total_pop)*1000,
    white_mh_incid_c = (white_mh_all_tot/white_pop)*1000,
    indig_mh_incid_c = (indig_mh_all_tot/na_pop)*1000,
    asian_mh_incid_c = (asian_mh_all_tot/asian_pop)*1000,
    black_mh_incid_c = (black_mh_all_tot/black_pop)*1000,
    latin_mh_incid_c = (latin_mh_all_tot/hisp_pop)*1000,
    depress_incid_c = (Depress_tot/total_pop)*1000,
    black_depress_incid_c = (black_Depress_tot/black_pop)*1000,
    white_depress_incid_c = (white_Depress_tot/white_pop)*1000,
    latin_depress_incid_c = (latin_Depress_tot/hisp_pop)*1000,
    etoh_incid_c = (etoh_tot/total_pop)*1000,
    black_etoh_incid_c = (black_etoh_tot/black_pop)*1000,
    white_etoh_incid_c = (white_etoh_tot/white_pop)*1000,
    latin_etoh_incid_c = (latin_etoh_tot/hisp_pop)*1000,
```

Table 1: Interrupted Time Series Models of Mental Health Diagnoses, Minneapolis 2016-2020

	Mental Health Diagnoses/1,000			
	Overall	White	Black	Latine
	(1)	(2)	(3)	(4)
T	-0.0001 (-0.001 0.0004)	0.0003 (-0.00001 0.001)	0.001 (0.0004 0.002)	0.002 (0.001 0.002)
Post-Killing	0.152 (-0.015 0.319)	0.061 (-0.022 0.144)	0.228 (0.042 0.413)	0.022 (-0.159 0.203)
T Post-Killing	-0.010 (-0.015 -0.004)	-0.005 (-0.007 -0.002)	-0.006 (-0.013 0.0002)	-0.001 (-0.007 0.005)
COVID - State of Emerg.	-0.198 (-0.357 -0.039)	-0.057 (-0.136 0.022)	-0.278 (-0.451 -0.104)	-0.096 (-0.263 0.071)
COVID - Stay at Home	0.066 (-0.096 0.228)	0.016 (-0.064 0.095)	0.193 (0.015 0.372)	-0.025 (-0.199 0.148)
MPD Use of Force t-1	0.395 (0.023 0.767)	0.233 (0.046 0.419)	0.100 (-0.312 0.512)	-0.060 (-0.463 0.342)
MPD Stops t-1	-0.030 (-0.091 0.031)	0.003 (-0.028 0.034)	0.040 (-0.028 0.108)	0.024 (-0.042 0.091)
MPD OIS t-1	-11.110 (-21.844 -0.377)	-3.596 (-8.951 1.759)	0.936 (-10.904 12.775)	-0.741 (-12.308 10.826)
Mean Max. Temp.	0.002 (0.0004 0.003)	0.0004 (-0.0001 0.001)	0.0002 (-0.001 0.001)	0.001 (-0.001 0.002)
Snow (in.)	0.011 (-0.036 0.057)	0.012 (-0.012 0.035)	-0.002 (-0.053 0.050)	-0.017 (-0.067 0.034)
Precip. (in.)	-0.260 (-0.425 -0.094)	-0.077 (-0.159 0.004)	-0.155 (-0.335 0.026)	-0.014 (-0.192 0.164)
AR(1) Overall	0.316 (0.181 0.452)			
AR(2) Overall	0.268 (0.131 0.404)			
AR(3) Overall	0.134 (0.0001 0.269)			
AR(1) White		0.458 (0.322 0.595)		
AR(2) White		0.200 (0.052 0.348)		
AR(3) White		0.110 (-0.030 0.250)		
AR(1) Black			0.340 (0.206 0.475)	
AR(2) Black			0.175 (0.035 0.314)	
AR(3) Black			0.230 (0.095 0.366)	
AR(1) Latine				0.076 (-0.063 0.215)
AR(2) Latine				0.122 (-0.016 0.260)
AR(3) Latine				0.101 (-0.037 0.240)
Constant	0.603 (0.257 0.948)	0.058 (-0.026 0.143)	0.014 (-0.160 0.188)	0.121 (-0.053 0.295)
Observations	216	216	216	216
R <sup>2</sup>	0.724	0.711	0.749	0.395
Residual Std. Error (df = 201)	0.126	0.063	0.140	0.137

*Note:*

95% Confidence Intervals in parentheses

```

anxiety_incid_c = (anxiety_tot/total_pop)*1000,
black_anxiety_incid_c = (black_anxiety_tot/black_pop)*1000,
white_anxiety_incid_c = (white_anxiety_tot/white_pop)*1000,
latin_anxiety_incid_c = (latin_anxiety_tot/hisp_pop)*1000,
chronic_incid_c = (chronic_tot/total_pop)*1000,
black_chronic_incid_c = (black_chronic_tot/black_pop)*1000,
white_chronic_incid_c = (white_chronic_tot/white_pop)*1000,
latin_chronic_incid_c = (latin_chronic_tot/hisp_pop)*1000,
acute_incid_c = (acute_tot/total_pop)*1000,
black_acute_incid_c = (black_acute_tot/black_pop)*1000,
white_acute_incid_c = (white_acute_tot/white_pop)*1000,
latin_acute_incid_c = (latin_acute_tot/hisp_pop)*1000,
t2 = t^2,
t_post_floyd2 = t_post_floyd^2)

#CFA: CD
library(lavaan)

cd_model_1 <- ' cd =~ unemp_rate + pov_rate + female_hh_rate + no_hs_dip_rate + black_pop
               black_pop =~ unemp_rate'

cfa_cd <- cfa(cd_model_1, data = panel, std.lv = T)

## Warning in lav_data_full(data = data, group = group, cluster = cluster, :
## lavaan WARNING: some observed variances are (at least) a factor 1000 times
## larger than others; use varTable(fit) to investigate

## Warning in lav_data_full(data = data, group = group, cluster = cluster, : lavaan WARNING: some observed varia
## lavaan NOTE: use varTable(fit) to investigate

modificationindices(cfa_cd)

##           lhs op           rhs      mi      epc sepc.lv sepc.all sepc.nox
## 13    unemp_rate ~~      pov_rate  6.692  1.221  1.221  0.035  0.035
## 14    unemp_rate ~~ female_hh_rate 98.234 -0.805 -0.805 -0.196 -0.196
## 15    unemp_rate ~~ no_hs_dip_rate 77.525  1.305  1.305  0.148  0.148
## 16      pov_rate ~~ female_hh_rate 667.761 -4.369 -4.369 -0.422 -0.422
## 17      pov_rate ~~ no_hs_dip_rate 592.734  8.179  8.179  0.369  0.369
## 19 female_hh_rate ~~ no_hs_dip_rate 13.188  0.339  0.339  0.128  0.128

summary(cfa_cd, fit.measures=TRUE, standardized = T)

## lavaan 0.6.15 ended normally after 47 iterations
##
##      Estimator                      ML
##      Optimization method          NLMINB
##      Number of model parameters          11
##
##      Number of observations          5742
##
## Model Test User Model:
##
##      Test statistic          1186.074
##      Degrees of freedom          4
##      P-value (Chi-square)          0.000
##
## Model Test Baseline Model:
##
##      Test statistic          15500.990
##      Degrees of freedom          10
##      P-value          0.000
##
## User Model versus Baseline Model:

```

```
##
## Comparative Fit Index (CFI) 0.924
## Tucker-Lewis Index (TLI) 0.809
##
## Loglikelihood and Information Criteria:
##
## Loglikelihood user model (H0) -115690.433
## Loglikelihood unrestricted model (H1) -115097.396
##
## Akaike (AIC) 231402.865
## Bayesian (BIC) 231476.076
## Sample-size adjusted Bayesian (SABIC) 231441.122
##
## Root Mean Square Error of Approximation:
##
## RMSEA 0.227
## 90 Percent confidence interval - lower 0.216
## 90 Percent confidence interval - upper 0.238
## P-value H_0: RMSEA <= 0.050 0.000
## P-value H_0: RMSEA >= 0.080 1.000
##
## Standardized Root Mean Square Residual:
##
## SRMR 0.049
##
## Parameter Estimates:
##
## Standard errors Standard
## Information Expected
## Information saturated (h1) model Structured
##
## Latent Variables:
## Estimate Std.Err z-value P(>|z|) Std.lv Std.all
## cd =~
## unemp_rate 1.834 0.056 32.752 0.000 1.834 0.444
## pov_rate 5.673 0.139 40.859 0.000 5.673 0.520
## female_hh_rate 1.925 0.024 80.082 0.000 1.925 0.866
## no_hs_dip_rate 3.434 0.046 74.115 0.000 3.434 0.822
## black_pop 3606.213 40.331 89.416 0.000 3606.213 0.930
##
## Covariances:
## Estimate Std.Err z-value P(>|z|) Std.lv Std.all
## .unemp_rate ~~
## .black_pop 422.838 109.450 3.863 0.000 422.838 0.080
##
## Variances:
## Estimate Std.Err z-value P(>|z|) Std.lv Std.all
## .unemp_rate 13.712 0.268 51.234 0.000 13.712 0.803
## .pov_rate 86.768 1.673 51.873 0.000 86.768 0.729
## .female_hh_rate 1.233 0.034 36.717 0.000 1.233 0.250
## .no_hs_dip_rate 5.657 0.132 42.766 0.000 5.657 0.324
## .black_pop 2047184.631 92832.942 22.052 0.000 2047184.631 0.136
## cd 1.000 1.000 1.000
```

```
cd_predict <- as.vector(lavPredict(cfa_cd, newdata = as.data.frame(panel)))
panel$conc_dis <- cd_predict
```

$$y_{ti} = \beta_{0i} + \beta_1 Time_t + \theta_i Event_t + \beta_2 TimePost_t + \phi \mathbf{X}_{ti} + \rho_1 y_{t-1} + \rho_2 y_{t-2} + \rho_3 y_{t-3} + \epsilon_{ti}$$

$$\beta_{0i} = \gamma_{00} + u_{0i}$$

$$\theta_i = \gamma_{10} + u_i$$

```
#random effects specifications
```

```
library(lme4)
```

```
library(lmerTest)
```

```
#RE random coefficient model
```

```
re <- lmer(mh_incid_c~t+post_floyd+t_post_floyd+  
          state_of_emerg+stay_at_home+  
          uof_lag+stops_lag+shoot_lag+  
          tmax_f+snow_in+precip_in+  
          conc_dis+  
          dplyr::lag(mh_incid_c, 1)+ dplyr::lag(mh_incid_c, 2)+  
          dplyr::lag(mh_incid_c, 3)+  
          (post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider  
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider  
## rescaling
```

```
summary(re)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
```

```
## lmerModLmerTest]
```

```
## Formula: mh_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
```

```
## stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
```

```
## snow_in + precip_in + conc_dis + dplyr::lag(mh_incid_c, 1) +
```

```
## dplyr::lag(mh_incid_c, 2) + dplyr::lag(mh_incid_c, 3) + (post_floyd |
```

```
## zcta)
```

```
## Data: panel
```

```
##
```

```
## REML criterion at convergence: 22599.4
```

```
##
```

```
## Scaled residuals:
```

```
##      Min       1Q   Median       3Q      Max
```

```
## -9.7586 -0.1650 -0.0106  0.1521 12.5475
```

```
##
```

```
## Random effects:
```

```
## Groups   Name                Variance Std.Dev. Corr
```

```
## zcta      (Intercept) 16.393    4.049
```

```
##          post_floyd1  2.483    1.576   -1.00
```

```
## Residual                2.926    1.710
```

```
## Number of obs: 5720, groups: zcta, 22
```

```
##
```

```
## Fixed effects:
```

```
##              Estimate Std. Error    df t value Pr(>|t|)  
## (Intercept)    2.992e+00  8.707e-01 2.161e+01   3.436 0.002404 **  
## t              4.581e-04  4.064e-04 5.310e+03   1.127 0.259756  
## post_floyd1    -1.273e-01  4.111e-01 4.303e+01  -0.310 0.758286  
## t_post_floyd   -4.351e-02  7.514e-03 5.663e+03  -5.791 7.36e-09 ***  
## state_of_emerg -8.585e-02  2.246e-01 5.661e+03  -0.382 0.702320  
## stay_at_home1  -5.244e-01  2.322e-01 5.660e+03  -2.258 0.023970 *  
## uof_lag        -3.583e-02  9.251e-03 5.686e+03  -3.873 0.000109 ***  
## stops_lag       1.137e-02  4.370e-03 5.545e+03   2.601 0.009322 **  
## shoot_lag      -9.170e-01  1.788e+00 5.666e+03  -0.513 0.608150  
## tmax_f          1.670e-03  1.319e-03 5.660e+03   1.266 0.205393  
## snow_in         8.557e-02  6.546e-02 5.660e+03   1.307 0.191211  
## precip_in       6.105e-02  2.196e-01 5.660e+03   0.278 0.781022  
## conc_dis        -2.238e-03  1.470e-01 2.853e+01  -0.015 0.987960  
## dplyr::lag(mh_incid_c, 1) -4.210e-03  1.321e-02 5.704e+03  -0.319 0.750062  
## dplyr::lag(mh_incid_c, 2) -1.277e-03  1.321e-02 5.704e+03  -0.097 0.923040  
## dplyr::lag(mh_incid_c, 3)  1.078e-02  1.321e-02 5.704e+03   0.816 0.414714
```



```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling

re_blk <- lmer(black_mh_incid_c~t+post_floyd+t_post_floyd+
              state_of_emerg+stay_at_home+
              uof_lag+stops_lag+shoot_lag+
              tmax_f+snow_in+precip_in+
              conc_dis+
              dplyr::lag(black_mh_incid_c, 1)+ dplyr::lag(black_mh_incid_c, 2)+
              dplyr::lag(black_mh_incid_c, 3)+
              (post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling

summary(re_blk)

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: black_mh_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + dplyr::lag(black_mh_incid_c,
##   1) + dplyr::lag(black_mh_incid_c, 2) + dplyr::lag(black_mh_incid_c,
##   3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 31496.9
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -2.232 -0.167 -0.025  0.091  36.715
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)    1.5582   1.2483
##           post_floyd1    0.1931   0.4394   -1.00
## Residual                14.1158   3.7571
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)    5.649e-01  3.327e-01  3.529e+01  1.698
## t              6.638e-03  9.018e-04  5.633e+03  7.361
## post_floyd1    2.529e+00  5.289e-01  2.025e+03  4.782
## t_post_floyd   -7.328e-02  1.647e-02  5.679e+03 -4.449
## state_of_emerg -2.241e+00  4.933e-01  5.679e+03 -4.542
## stay_at_home1  1.972e+00  5.096e-01  5.678e+03  3.870
## uof_lag        -6.266e-02  1.984e-02  3.652e+03 -3.159
## stops_lag      1.543e-02  9.152e-03  1.477e+03  1.686
## shoot_lag      -1.809e+00  3.943e+00  5.680e+03 -0.459
## tmax_f         -8.872e-04  2.895e-03  5.680e+03 -0.307
## snow_in        -7.763e-02  1.437e-01  5.678e+03 -0.540
## precip_in      -4.371e-01  4.825e-01  5.678e+03 -0.906
## conc_dis       -7.076e-01  2.115e-01  2.642e+01 -3.346
## dplyr::lag(black_mh_incid_c, 1) -8.918e-03  1.325e-02  5.704e+03 -0.673
## dplyr::lag(black_mh_incid_c, 2)  2.169e-02  1.319e-02  5.703e+03  1.644
## dplyr::lag(black_mh_incid_c, 3)  5.481e-03  1.319e-02  5.703e+03  0.415
##
## Pr(>|t|)
```

```
## (Intercept)                0.09828 .
## t                          2.09e-13 ***
## post_floyd1                1.86e-06 ***
## t_post_floyd              8.79e-06 ***
## state_of_emerg1           5.69e-06 ***
## stay_at_home1             0.00011 ***
## uof_lag                    0.00160 **
## stops_lag                  0.09203 .
## shoot_lag                  0.64639
## tmax_f                     0.75923
## snow_in                    0.58907
## precip_in                  0.36506
## conc_dis                   0.00247 **
## dplyr::lag(black_mh_incid_c, 1) 0.50082
## dplyr::lag(black_mh_incid_c, 2) 0.10015
## dplyr::lag(black_mh_incid_c, 3) 0.67780
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling

re_white <- lmer(white_mh_incid_c~t+post_floyd+t_post_floyd+
                state_of_emerg+stay_at_home+
                uof_lag+stops_lag+shoot_lag+
                tmax_f+snow_in+precip_in+
                conc_dis+
                dplyr::lag(white_mh_incid_c, 1)+ dplyr::lag(white_mh_incid_c, 2)+
                dplyr::lag(white_mh_incid_c, 3)+
                (post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling

summary(re_white)

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: white_mh_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + dplyr::lag(white_mh_incid_c,
##   1) + dplyr::lag(white_mh_incid_c, 2) + dplyr::lag(white_mh_incid_c,
##   3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 14574.5
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -5.2488 -0.2342 -0.0216  0.1863 16.1090
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept) 0.58285   0.7634
##           post_floyd1 0.04938   0.2222  -0.67
## Residual                0.72058   0.8489
## Number of obs: 5720, groups: zcta, 22
##
## Fixed effects:
##               Estimate Std. Error      df t value
## (Intercept)  2.999e-01  1.691e-01 1.604e+01  1.774
```

```
## t                2.973e-03  2.183e-04  4.130e+03  13.618
## post_floyd1      -1.309e-01  1.268e-01  4.023e+02  -1.033
## t_post_floyd     -1.358e-02  3.710e-03  5.603e+03  -3.661
## state_of_emerg1  -1.012e-01  1.115e-01  5.599e+03  -0.908
## stay_at_home1    -1.617e-01  1.151e-01  5.594e+03  -1.405
## uof_lag          -2.855e-02  4.577e-03  5.633e+03  -6.236
## stops_lag        9.537e-03  2.153e-03  4.402e+03  4.430
## shoot_lag        -6.658e-01  8.876e-01  5.604e+03  -0.750
## tmax_f           1.343e-03  6.547e-04  5.596e+03  2.052
## snow_in          2.330e-02  3.247e-02  5.594e+03  0.717
## precip_in        -7.468e-02  1.090e-01  5.597e+03  -0.685
## conc_dis         -2.928e-01  9.921e-02  1.549e+01  -2.952
## dplyr::lag(white_mh_incid_c, 1) 1.581e-03  1.315e-02  5.668e+03  0.120
## dplyr::lag(white_mh_incid_c, 2) 3.543e-02  1.315e-02  5.688e+03  2.695
## dplyr::lag(white_mh_incid_c, 3) 1.602e-03  1.315e-02  5.678e+03  0.122
##
## Pr(>|t|)
## (Intercept)      0.095111 .
## t                < 2e-16 ***
## post_floyd1      0.302385
## t_post_floyd     0.000253 ***
## state_of_emerg1  0.364100
## stay_at_home1    0.160073
## uof_lag          4.80e-10 ***
## stops_lag        9.65e-06 ***
## shoot_lag        0.453264
## tmax_f           0.040212 *
## snow_in          0.473193
## precip_in        0.493249
## conc_dis         0.009633 **
## dplyr::lag(white_mh_incid_c, 1) 0.904280
## dplyr::lag(white_mh_incid_c, 2) 0.007059 **
## dplyr::lag(white_mh_incid_c, 3) 0.903006
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
```

```
re_latin <- lmer(latin_mh_incid_c~t+post_floyd+t_post_floyd+
                 state_of_emerg+stay_at_home+
                 uof_lag+stops_lag+shoot_lag+
                 tmax_f+snow_in+precip_in+
                 conc_dis+
                 dplyr::lag(latin_mh_incid_c, 1)+ dplyr::lag(latin_mh_incid_c, 2)+
                 dplyr::lag(latin_mh_incid_c, 3)+
                 (post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_latin)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: latin_mh_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
## stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
## snow_in + precip_in + conc_dis + dplyr::lag(latin_mh_incid_c,
## 1) + dplyr::lag(latin_mh_incid_c, 2) + dplyr::lag(latin_mh_incid_c,
## 3) + (post_floyd | zcta)
## Data: panel
##
```

```

## REML criterion at convergence: 40119.3
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.313 -0.089 -0.015  0.051 61.171
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)         3.1916  1.7865
##           post_floyd1         0.1272  0.3567  -1.00
## Residual                        83.2191  9.1224
## Number of obs: 5516, groups:  zcta, 22
##
## Fixed effects:
##                                     Estimate Std. Error      df t value
## (Intercept)                      1.997e-01  6.314e-01  7.046e+01  0.316
## t                                7.108e-03  2.236e-03  5.490e+03  3.179
## post_floyd1                      -2.193e-01  1.267e+00  4.702e+03 -0.173
## t_post_floyd                     1.460e-02  3.978e-02  5.471e+03  0.367
## state_of_emerg1                  -9.944e-01  1.199e+00  5.472e+03 -0.829
## stay_at_home1                   4.659e-01  1.237e+00  5.468e+03  0.377
## uof_lag                          5.133e-01  7.178e-02  4.348e+03  7.152
## stops_lag                       -6.699e-02  2.727e-02  1.023e+02 -2.457
## shoot_lag                       -4.344e+00  9.564e+00  5.475e+03 -0.454
## tmax_f                          -5.726e-03  7.153e-03  5.476e+03 -0.801
## snow_in                        -4.534e-01  3.521e-01  5.468e+03 -1.288
## precip_in                       5.901e+00  1.199e+00  5.471e+03  4.922
## conc_dis                       -6.303e-01  3.864e-01  1.511e+01 -1.631
## dplyr::lag(latin_mh_incid_c, 1) -3.204e-03  1.342e-02  5.495e+03 -0.239
## dplyr::lag(latin_mh_incid_c, 2) -1.101e-02  1.342e-02  5.495e+03 -0.820
## dplyr::lag(latin_mh_incid_c, 3) -6.516e-03  1.342e-02  5.494e+03 -0.485
##                                     Pr(>|t|)
## (Intercept)                      0.75268
## t                                0.00148 **
## post_floyd1                      0.86255
## t_post_floyd                     0.71366
## state_of_emerg1                  0.40698
## stay_at_home1                   0.70651
## uof_lag                          1.0e-12 ***
## stops_lag                       0.01570 *
## shoot_lag                       0.64970
## tmax_f                          0.42342
## snow_in                        0.19790
## precip_in                       8.8e-07 ***
## conc_dis                       0.12349
## dplyr::lag(latin_mh_incid_c, 1)  0.81131
## dplyr::lag(latin_mh_incid_c, 2)  0.41206
## dplyr::lag(latin_mh_incid_c, 3)  0.62736
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_blk_nl <- lmer(black_mh_incid_c~t+t2+post_floyd+t_post_floyd+t_post_floyd2+
                  state_of_emerg+stay_at_home+
                  uof_lag+stops_lag+shoot_lag+
                  tmax_f+snow_in+precip_in+
                  conc_dis+
                  dplyr::lag(black_mh_incid_c, 1)+ dplyr::lag(black_mh_incid_c, 2)+
                  dplyr::lag(black_mh_incid_c, 3)+

```

```

(post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling
summary(re_blk_nl)

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## black_mh_incid_c ~ t + t2 + post_floyd + t_post_floyd + t_post_floyd2 +
##   state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##   tmax_f + snow_in + precip_in + conc_dis + dplyr::lag(black_mh_incid_c,
##   1) + dplyr::lag(black_mh_incid_c, 2) + dplyr::lag(black_mh_incid_c,
##   3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 31522.4
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -2.199 -0.165 -0.025  0.097 36.618
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)         1.5893   1.2607
##           post_floyd1         0.1992   0.4463   -1.00
## Residual                    14.1065   3.7559
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)    4.369e-01  3.506e-01 4.204e+01  1.246
## t              9.880e-03  3.605e-03 5.702e+03  2.741
## t2            -1.433e-05  1.570e-05 5.697e+03 -0.913
## post_floyd1     3.005e+00  5.694e-01 2.385e+03  5.278
## t_post_floyd   -1.983e-01  6.270e-02 5.677e+03 -3.162
## t_post_floyd2    4.110e-03  1.932e-03 5.676e+03  2.128
## state_of_emerg1 -1.920e+00  5.182e-01 5.677e+03 -3.705
## stay_at_home1    1.722e+00  5.244e-01 5.676e+03  3.283
## uof_lag         -6.218e-02  1.984e-02 3.712e+03 -3.134
## stops_lag        1.377e-02  9.289e-03 1.464e+03  1.483
## shoot_lag       -1.870e+00  3.942e+00 5.678e+03 -0.474
## tmax_f          -5.225e-04  2.943e-03 5.676e+03 -0.178
## snow_in         -8.314e-02  1.442e-01 5.676e+03 -0.576
## precip_in       -5.170e-01  4.846e-01 5.676e+03 -1.067
## conc_dis        -7.098e-01  2.123e-01 2.669e+01 -3.344
## dplyr::lag(black_mh_incid_c, 1) -1.015e-02  1.325e-02 5.702e+03 -0.766
## dplyr::lag(black_mh_incid_c, 2)  2.037e-02  1.320e-02 5.701e+03  1.544
## dplyr::lag(black_mh_incid_c, 3)  4.216e-03  1.320e-02 5.701e+03  0.319
##
##              Pr(>|t|)
## (Intercept)    0.219606
## t              0.006147 **
## t2            0.361409
## post_floyd1    1.43e-07 ***
## t_post_floyd   0.001574 **
## t_post_floyd2  0.033404 *
## state_of_emerg1 0.000213 ***
## stay_at_home1  0.001034 **

```

```
## uof_lag                0.001738 **
## stops_lag              0.138397
## shoot_lag              0.635181
## tmax_f                 0.859093
## snow_in                0.564350
## precip_in              0.286064
## conc_dis               0.002457 **
## dplyr::lag(black_mh_incid_c, 1) 0.443603
## dplyr::lag(black_mh_incid_c, 2) 0.122716
## dplyr::lag(black_mh_incid_c, 3) 0.749405
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_white_nl <- lmer(white_mh_incid_c~t+t2+post_floyd+t_post_floyd+t_post_floyd2+
                    state_of_emerg+stay_at_home+
                    uof_lag+stops_lag+shoot_lag+
                    tmax_f+snow_in+precip_in+
                    conc_dis+
                    dplyr::lag(white_mh_incid_c, 1)+ dplyr::lag(white_mh_incid_c, 2)+
                    dplyr::lag(white_mh_incid_c, 3)+
                    (post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_white_nl)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## white_mh_incid_c ~ t + t2 + post_floyd + t_post_floyd + t_post_floyd2 +
##   state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##   tmax_f + snow_in + precip_in + conc_dis + dplyr::lag(white_mh_incid_c,
##   1) + dplyr::lag(white_mh_incid_c, 2) + dplyr::lag(white_mh_incid_c,
##   3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 14572.9
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -5.2264 -0.2376 -0.0239  0.1938 16.1043
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept) 0.57672   0.7594
##           post_floyd1 0.05304   0.2303   -0.75
## Residual              0.71619   0.8463
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)   1.623e-01  1.698e-01 1.894e+01  0.956
## t              7.988e-03  8.406e-04 5.693e+03  9.503
## t2            -2.212e-05  3.593e-06 5.624e+03 -6.155
## post_floyd1   -1.279e-01  1.355e-01 4.824e+02 -0.944
```

```

## t_post_floyd          5.102e-03  1.407e-02  5.596e+03  0.363
## t_post_floyd2        -4.405e-04  4.345e-04  5.595e+03 -1.014
## state_of_emerg1       5.285e-02  1.168e-01  5.603e+03  0.453
## stay_at_home1        -1.163e-01  1.181e-01  5.595e+03 -0.985
## uof_lag              -2.877e-02  4.564e-03  5.639e+03 -6.304
## stops_lag            7.194e-03  2.180e-03  4.521e+03  3.300
## shoot_lag            -7.128e-01  8.850e-01  5.607e+03 -0.805
## tmax_f               7.206e-04  6.633e-04  5.598e+03  1.086
## snow_in              5.778e-03  3.250e-02  5.595e+03  0.178
## precip_in            -4.527e-02  1.091e-01  5.598e+03 -0.415
## conc_dis             -2.364e-01  9.480e-02  1.391e+01 -2.494
## dplyr::lag(white_mh_incid_c, 1) -6.367e-03  1.317e-02  5.673e+03 -0.483
## dplyr::lag(white_mh_incid_c, 2)  2.669e-02  1.318e-02  5.693e+03  2.025
## dplyr::lag(white_mh_incid_c, 3) -6.094e-03  1.316e-02  5.682e+03 -0.463
##
## Pr(>|t|)
## (Intercept)          0.351179
## t                    < 2e-16 ***
## t2                   8.04e-10 ***
## post_floyd1          0.345669
## t_post_floyd         0.716817
## t_post_floyd2        0.310624
## state_of_emerg1      0.650827
## stay_at_home1        0.324598
## uof_lag              3.11e-10 ***
## stops_lag            0.000974 ***
## shoot_lag            0.420621
## tmax_f               0.277357
## snow_in              0.858882
## precip_in            0.678354
## conc_dis             0.025844 *
## dplyr::lag(white_mh_incid_c, 1) 0.628783
## dplyr::lag(white_mh_incid_c, 2) 0.042864 *
## dplyr::lag(white_mh_incid_c, 3) 0.643429
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling

re_latin_nl<- lmer(latin_mh_incid_c~t+t2+post_floyd+t_post_floyd+t_post_floyd2+
                  state_of_emerg+stay_at_home+
                  uof_lag+stops_lag+shoot_lag+
                  tmax_f+snow_in+precip_in+
                  conc_dis+
                  dplyr::lag(latin_mh_incid_c, 1)+ dplyr::lag(latin_mh_incid_c, 2)+
                  dplyr::lag(latin_mh_incid_c, 3)+
                  (post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling

summary(re_latin_nl)

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## latin_mh_incid_c ~ t + t2 + post_floyd + t_post_floyd + t_post_floyd2 +
## state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
## tmax_f + snow_in + precip_in + conc_dis + dplyr::lag(latin_mh_incid_c,
## 1) + dplyr::lag(latin_mh_incid_c, 2) + dplyr::lag(latin_mh_incid_c,
## 3) + (post_floyd | zcta)

```



```

## Data: panel
##
## REML criterion at convergence: 40144.1
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.308 -0.084 -0.020  0.048 61.162
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)         3.3438   1.8286
##           post_floyd1         0.1379   0.3714   -1.00
## Residual                    83.1992   9.1214
## Number of obs: 5516, groups: zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)   -2.322e-01  6.981e-01  9.628e+01  -0.333
## t              2.102e-02  9.120e-03  5.482e+03   2.305
## t2            -6.175e-05  3.923e-05  5.489e+03  -1.574
## post_floyd1   -1.625e-01  1.365e+00  4.840e+03  -0.119
## t_post_floyd  5.476e-02  1.517e-01  5.467e+03   0.361
## t_post_floyd2 -8.128e-04  4.684e-03  5.465e+03  -0.174
## state_of_emerg1 -5.495e-01  1.260e+00  5.466e+03  -0.436
## stay_at_home1  5.752e-01  1.273e+00  5.465e+03   0.452
## uof_lag        5.143e-01  7.182e-02  4.385e+03   7.160
## stops_lag     -7.383e-02  2.762e-02  1.021e+02  -2.673
## shoot_lag     -4.478e+00  9.564e+00  5.472e+03  -0.468
## tmax_f        -7.437e-03  7.275e-03  5.470e+03  -1.022
## snow_in       -5.046e-01  3.535e-01  5.466e+03  -1.427
## precip_in      5.989e+00  1.204e+00  5.468e+03   4.972
## conc_dis      -6.403e-01  3.930e-01  1.515e+01  -1.629
## dplyr::lag(latin_mh_incid_c, 1) -3.552e-03  1.342e-02  5.494e+03  -0.265
## dplyr::lag(latin_mh_incid_c, 2) -1.138e-02  1.343e-02  5.494e+03  -0.848
## dplyr::lag(latin_mh_incid_c, 3) -6.865e-03  1.342e-02  5.494e+03  -0.511
##
##              Pr(>|t|)
## (Intercept)    0.74014
## t              0.02120 *
## t2             0.11553
## post_floyd1    0.90523
## t_post_floyd   0.71812
## t_post_floyd2  0.86224
## state_of_emerg1 0.66268
## stay_at_home1  0.65141
## uof_lag        9.39e-13 ***
## stops_lag      0.00876 **
## shoot_lag      0.63966
## tmax_f         0.30676
## snow_in        0.15354
## precip_in      6.82e-07 ***
## conc_dis       0.12391
## dplyr::lag(latin_mh_incid_c, 1) 0.79131
## dplyr::lag(latin_mh_incid_c, 2) 0.39649
## dplyr::lag(latin_mh_incid_c, 3) 0.60910
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

```

```

#extract random coefficients
re_pf_white <- as.data.frame(coef(re_white)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_white = post_floyd1)

re_pf_blk <- as.data.frame(coef(re_blk)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_blk = post_floyd1)

re_pf_latin <- as.data.frame(coef(re_latin)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_latin = post_floyd1)

#aggregate to zip-level over years
zip_level <- panel %>%
  group_by(zcta) %>%
  summarize(mh_all_tot = sum(mh_all_tot, na.rm = T),
            total_pop = sum(total_pop, na.rm = T),
            conc_dis = mean(conc_dis, na.rm = T)) %>%
  mutate(mh_incid_c = (mh_all_tot/total_pop)*1000) %>%
  ungroup() %>%
  left_join(zcta, by = "zcta")

zip_level <- zip_level %>%
  left_join(re_pf_white, by = c("zcta" = "zipcode")) %>%
  left_join(re_pf_blk, by = c("zcta" = "zipcode")) %>%
  left_join(re_pf_latin, by = c("zcta" = "zipcode"))

#george floyd square
gfs <- geocode("George Floyd Square, Minneapolis", output = "latlon") %>%
  st_as_sf(coords = c("lon", "lat"), crs = "NAD83", remove=F) %>%
  mutate(name = "George Floyd Square")

re_coef_map_white <- ggplot() +
  geom_sf(data = zip_level, aes(geometry = geometry, fill = post_floyd1_white), color = "lightgrey") +
  geom_sf(data = mpl, aes(geometry = geometry), color = "black", alpha = 0)+
  geom_sf(data = gfs, aes(geometry = geometry), color = "black")+
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                 size = 2,
                 fontface = "bold")+
  scale_fill_distiller(palette = "Spectral",
                      limits = c(min(zip_level$post_floyd1_latin),
                                max(zip_level$post_floyd1_blk)))+
  labs(title = "Figure 3: RE Coefficients-White Residents",
       subtitle = "Rate per 1,000",
       fill = "Post-Killing Change")+
  theme(axis.text.x = element_blank(),
        axis.text.y = element_blank(),
        axis.line = element_blank(),
        axis.ticks = element_blank(),
        panel.border = element_blank(),
        panel.grid = element_blank(),
        axis.title = element_blank(),
        panel.background = element_blank(),

```

```

panel.grid.major = element_line(colour="transparent"),
plot.subtitle = element_text(face="italic"),
strip.background = element_rect(fill = "white",
                                colour = "black"))+
ggspatial::annotation_scale()+
ggspatial::annotation_north_arrow(which_north = "true",
                                location = "tr")

re_coef_map_blk <- ggplot() +
  geom_sf(data = zip_level, aes(geometry = geometry, fill = post_floyd1_blk), color = "lightgrey") +
  geom_sf(data = mp1s, aes(geometry = geometry), color = "black", alpha = 0)+
  geom_sf(data = gfs, aes(geometry = geometry), color = "black")+
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold")+
scale_fill_distiller(palette = "Spectral",
                    limits = c(min(zip_level$post_floyd1_latin),
                              max(zip_level$post_floyd1_blk)))+
labs(title = "Figure 4: RE Coefficients-Black Residents",
     subtitle = "Rate per 1,000",
     fill = "Post-Killing Change")+
theme(axis.text.x = element_blank(),
      axis.text.y = element_blank(),
      axis.line = element_blank(),
      axis.ticks = element_blank(),
      panel.border = element_blank(),
      panel.grid = element_blank(),
      axis.title = element_blank(),
      panel.background = element_blank(),
      panel.grid.major = element_line(colour="transparent"),
      plot.subtitle = element_text(face="italic"),
      strip.background = element_rect(fill = "white",
                                      colour = "black"))+
ggspatial::annotation_scale()+
ggspatial::annotation_north_arrow(which_north = "true",
                                location = "tr")

re_coef_map_latin <- ggplot() +
  geom_sf(data = zip_level, aes(geometry = geometry, fill = post_floyd1_latin), color = "lightgrey") +
  geom_sf(data = mp1s, aes(geometry = geometry), color = "black", alpha = 0)+
  geom_sf(data = gfs, aes(geometry = geometry), color = "black")+
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold")+
scale_fill_distiller(palette = "Spectral",
                    limits = c(min(zip_level$post_floyd1_latin),
                              max(zip_level$post_floyd1_blk)))+
labs(title = "Figure 5: RE Coefficients-Latine Residents",
     subtitle = "Rate per 1,000",
     fill = "Post-Killing Change")+
theme(axis.text.x = element_blank(),
      axis.text.y = element_blank(),
      axis.line = element_blank(),
      axis.ticks = element_blank(),
      panel.border = element_blank(),
      panel.grid = element_blank(),
      axis.title = element_blank(),
      panel.background = element_blank(),
      panel.grid.major = element_line(colour="transparent"),
      plot.subtitle = element_text(face="italic"),
      strip.background = element_rect(fill = "white",
                                      colour = "black"),

```

```

        colour = "black"))+
ggspatial::annotation_scale()+
ggspatial::annotation_north_arrow(which_north = "true",
                                  location = "tr")

cd_map <- ggplot() +
  geom_sf(data = zip_level, aes(geometry = geometry, fill = conc_dis), color="lightgrey") +
  geom_sf(data = mpl, aes(geometry = geometry), color = "black", alpha = 0)+
  geom_sf(data = gfs, aes(geometry = geometry), color = "black")+
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold")+
  scale_fill_distiller(palette = "Spectral")+
  labs(title = "Figure 6: Concentrated Disadvantage",
        subtitle = "Standard Deviation Units",
        fill = "Conc. Disad.")+
  theme(axis.text.x = element_blank(),
        axis.text.y = element_blank(),
        axis.line = element_blank(),
        axis.ticks = element_blank(),
        panel.border = element_blank(),
        panel.grid = element_blank(),
        axis.title = element_blank(),
        panel.background = element_blank(),
        panel.grid.major = element_line(colour="transparent"),
        plot.subtitle = element_text(face="italic"),
        strip.background = element_rect(fill = "white",
        colour = "black"))+
ggspatial::annotation_scale()+
ggspatial::annotation_north_arrow(which_north = "true",
                                  location = "tr")

#RE random coefficient model - interaction
re_int <- lmer(mh_incid_c~t+post_floyd+t_post_floyd+
              state_of_emerg+stay_at_home+
              uof_lag+stops_lag+shoot_lag+
              tmax_f+snow_in+precip_in+conc_dis+
              post_floyd:conc_dis+
              dplyr::lag(mh_incid_c, 1)+ dplyr::lag(mh_incid_c, 2)+
              dplyr::lag(mh_incid_c, 3)+
              (1+post_floyd|zcta), data = panel)

```

```

## Warning: Some predictor variables are on very different scales: consider
## rescaling

```

```

## Warning: Some predictor variables are on very different scales: consider
## rescaling

```

```
summary(re_int)
```

```

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: mh_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(mh_incid_c,
##   1) + dplyr::lag(mh_incid_c, 2) + dplyr::lag(mh_incid_c, 3) +
##   (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 22591.2
##
## Scaled residuals:

```

```
##      Min      1Q  Median      3Q      Max
## -9.7804 -0.1682 -0.0113  0.1505 12.5853
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## zcta     (Intercept) 16.690    4.085
##          post_floyd1  2.547    1.596   -1.00
## Residual                2.922    1.710
## Number of obs: 5720, groups: zcta, 22
##
## Fixed effects:
##              Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)    3.039e+00  8.785e-01  2.154e+01   3.459 0.002283 **
## t              1.220e-04  4.194e-04  5.662e+03   0.291 0.771200
## post_floyd1    -1.058e-01  4.146e-01  4.213e+01  -0.255 0.799884
## t_post_floyd   -4.302e-02  7.511e-03  5.683e+03  -5.727 1.07e-08 ***
## state_of_emerg1 -9.819e-02  2.245e-01  5.682e+03  -0.437 0.661866
## stay_at_home1  -5.214e-01  2.321e-01  5.682e+03  -2.246 0.024713 *
## uof_lag        -3.357e-02  9.271e-03  5.698e+03  -3.621 0.000296 ***
## stops_lag       9.012e-03  4.426e-03  5.654e+03   2.036 0.041788 *
## shoot_lag      -8.580e-01  1.787e+00  5.682e+03  -0.480 0.631227
## tmax_f          1.712e-03  1.318e-03  5.682e+03   1.299 0.194044
## snow_in         8.507e-02  6.543e-02  5.682e+03   1.300 0.193551
## precip_in       7.036e-02  2.195e-01  5.682e+03   0.321 0.748553
## conc_dis        -8.042e-01  2.889e-01  1.586e+03  -2.784 0.005440 **
## dplyr::lag(mh_incid_c, 1) -3.828e-03  1.320e-02  5.703e+03  -0.290 0.771924
## dplyr::lag(mh_incid_c, 2) -1.053e-05  1.321e-02  5.703e+03  -0.001 0.999364
## dplyr::lag(mh_incid_c, 3)  9.147e-03  1.321e-02  5.703e+03   0.693 0.488646
## post_floyd1:conc_dis    4.537e-01  1.395e-01  4.260e+02   3.252 0.001239 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_int_blk <- lmer(black_mh_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+conc_dis+
  post_floyd:conc_dis+
  dplyr::lag(black_mh_incid_c, 1)+ dplyr::lag(black_mh_incid_c, 2)+
  dplyr::lag(black_mh_incid_c, 3)+
  (1+post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling

summary(re_int_blk)

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: black_mh_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
## stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
## snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(black_mh_incid_c,
## 1) + dplyr::lag(black_mh_incid_c, 2) + dplyr::lag(black_mh_incid_c,
## 3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 31498.4
```

```
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.238 -0.167 -0.025  0.091 36.722
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)         1.6208  1.2731
##           post_floyd1         0.2208  0.4699  -1.00
## Residual                14.1164  3.7572
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##               Estimate Std. Error      df t value
## (Intercept)      5.683e-01  3.371e-01  3.137e+01  1.686
## t                6.628e-03  9.044e-04  5.462e+03  7.329
## post_floyd1      2.530e+00  5.301e-01  1.676e+03  4.771
## t_post_floyd     -7.323e-02  1.647e-02  5.678e+03 -4.446
## state_of_emerg1  -2.242e+00  4.933e-01  5.677e+03 -4.545
## stay_at_home1    1.972e+00  5.096e-01  5.676e+03  3.869
## uof_lag          -6.327e-02  1.985e-02  3.620e+03 -3.187
## stops_lag        1.471e-02  9.211e-03  1.330e+03  1.597
## shoot_lag        -1.804e+00  3.943e+00  5.678e+03 -0.457
## tmax_f           -8.782e-04  2.895e-03  5.678e+03 -0.303
## snow_in          -7.766e-02  1.437e-01  5.675e+03 -0.540
## precip_in        -4.364e-01  4.825e-01  5.676e+03 -0.904
## conc_dis         -7.458e-01  2.677e-01  2.039e+01 -2.786
## dplyr::lag(black_mh_incid_c, 1) -8.928e-03  1.325e-02  5.703e+03 -0.674
## dplyr::lag(black_mh_incid_c, 2)  2.180e-02  1.319e-02  5.701e+03  1.652
## dplyr::lag(black_mh_incid_c, 3)  5.513e-03  1.319e-02  5.702e+03  0.418
## post_floyd1:conc_dis  3.887e-02  1.852e-01  3.742e+01  0.210
##               Pr(>|t|)
## (Intercept)      0.10171
## t                2.67e-13 ***
## post_floyd1      1.99e-06 ***
## t_post_floyd     8.93e-06 ***
## state_of_emerg1  5.62e-06 ***
## stay_at_home1    0.00011 ***
## uof_lag          0.00145 **
## stops_lag        0.11047
## shoot_lag        0.64735
## tmax_f           0.76160
## snow_in          0.58895
## precip_in        0.36588
## conc_dis         0.01127 *
## dplyr::lag(black_mh_incid_c, 1) 0.50036
## dplyr::lag(black_mh_incid_c, 2) 0.09855 .
## dplyr::lag(black_mh_incid_c, 3) 0.67606
## post_floyd1:conc_dis 0.83489
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptrwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_int_white <- lmer(white_mh_incid_c~t+post_floyd+t_post_floyd+
                    state_of_emerg+stay_at_home+
                    uof_lag+stops_lag+shoot_lag+
                    tmax_f+snow_in+precip_in+conc_dis+
                    post_floyd:conc_dis+
                    dplyr::lag(white_mh_incid_c, 1)+ dplyr::lag(white_mh_incid_c, 2)+
```

```
dplyr::lag(white_mh_incid_c, 3)+
  (1+post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_int_white)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: white_mh_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(white_mh_incid_c,
##   1) + dplyr::lag(white_mh_incid_c, 2) + dplyr::lag(white_mh_incid_c,
##   3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 14547.8
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -5.2066 -0.2363 -0.0201  0.1899 16.0845
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## zcta     (Intercept) 0.94451  0.9719
##          post_floyd1 0.09707  0.3116  -1.00
## Residual              0.71753  0.8471
## Number of obs: 5720, groups: zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)    3.233e-01  2.122e-01 1.580e+01  1.523
## t              2.831e-03  2.201e-04 5.188e+03 12.867
## post_floyd1    -1.166e-01  1.349e-01 1.351e+02 -0.865
## t_post_floyd   -1.333e-02  3.702e-03 5.676e+03 -3.601
## state_of_emerg1 -1.084e-01  1.113e-01 5.675e+03 -0.974
## stay_at_home1   -1.610e-01  1.149e-01 5.674e+03 -1.402
## uof_lag         -2.860e-02  4.580e-03 5.676e+03 -6.244
## stops_lag       7.482e-03  2.171e-03 4.833e+03  3.447
## shoot_lag       -6.309e-01  8.857e-01 5.674e+03 -0.712
## tmax_f          1.374e-03  6.533e-04 5.674e+03  2.102
## snow_in         2.305e-02  3.241e-02 5.674e+03  0.711
## precip_in       -7.014e-02  1.088e-01 5.675e+03 -0.645
## conc_dis        -6.571e-01  1.230e-01 1.394e+02 -5.342
## dplyr::lag(white_mh_incid_c, 1) 1.643e-03  1.312e-02 5.698e+03  0.125
## dplyr::lag(white_mh_incid_c, 2) 3.668e-02  1.312e-02 5.696e+03  2.796
## dplyr::lag(white_mh_incid_c, 3) 2.356e-04  1.312e-02 5.697e+03  0.018
## post_floyd1:conc_dis 3.398e-01  5.532e-02 5.827e+01  6.142
##
##              Pr(>|t|)
## (Intercept)    0.147396
## t              < 2e-16 ***
## post_floyd1    0.388830
## t_post_floyd   0.000320 ***
## state_of_emerg1 0.329954
## stay_at_home1   0.161020
## uof_lag         4.58e-10 ***
## stops_lag       0.000572 ***
## shoot_lag       0.476307
```



```
## tmax_f 0.035554 *
## snow_in 0.476900
## precip_in 0.519064
## conc_dis 3.66e-07 ***
## dplyr::lag(white_mh_incid_c, 1) 0.900316
## dplyr::lag(white_mh_incid_c, 2) 0.005196 **
## dplyr::lag(white_mh_incid_c, 3) 0.985670
## post_floyd1:conc_dis 7.80e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_int_latin <- lmer(latin_mh_incid_c~t+post_floyd+t_post_floyd+
                    state_of_emerg+stay_at_home+
                    uof_lag+stops_lag+shoot_lag+
                    tmax_f+snow_in+precip_in+conc_dis+
                    post_floyd:conc_dis+
                    dplyr::lag(latin_mh_incid_c, 1)+ dplyr::lag(latin_mh_incid_c, 2)+
                    dplyr::lag(latin_mh_incid_c, 3)+
                    (1+post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_int_latin)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: latin_mh_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(latin_mh_incid_c,
##   1) + dplyr::lag(latin_mh_incid_c, 2) + dplyr::lag(latin_mh_incid_c,
##   3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 40118.7
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -2.320 -0.089 -0.016  0.052 61.168
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)    3.3889   1.8409
##           post_floyd1    0.1692   0.4113  -1.00
##   Residual                83.2105   9.1220
## Number of obs: 5516, groups:  zcta, 22
##
## Fixed effects:
##                                     Estimate Std. Error      df t value
## (Intercept)                2.185e-01  6.388e-01  6.206e+01  0.342
## t                          7.073e-03  2.237e-03  5.468e+03  3.162
## post_floyd1                -2.107e-01  1.267e+00  4.432e+03 -0.166
## t_post_floyd                1.479e-02  3.978e-02  5.469e+03  0.372
## state_of_emerg1            -1.004e+00  1.199e+00  5.470e+03 -0.837
## stay_at_home1              4.668e-01  1.237e+00  5.465e+03  0.377
## uof_lag                    5.138e-01  7.178e-02  4.374e+03  7.158
```

```
## stops_lag -7.168e-02 2.771e-02 9.553e+01 -2.587
## shoot_lag -4.309e+00 9.564e+00 5.472e+03 -0.451
## tmax_f -5.680e-03 7.153e-03 5.474e+03 -0.794
## snow_in -4.538e-01 3.521e-01 5.465e+03 -1.289
## precip_in 5.905e+00 1.199e+00 5.468e+03 4.926
## conc_dis -7.599e-01 4.230e-01 1.331e+01 -1.796
## dplyr::lag(latin_mh_incid_c, 1) -3.238e-03 1.342e-02 5.495e+03 -0.241
## dplyr::lag(latin_mh_incid_c, 2) -1.111e-02 1.342e-02 5.495e+03 -0.827
## dplyr::lag(latin_mh_incid_c, 3) -6.523e-03 1.342e-02 5.494e+03 -0.486
## post_floyd1:conc_dis 3.011e-01 3.871e-01 1.419e+02 0.778
## Pr(>|t|)
## (Intercept) 0.73342
## t 0.00157 **
## post_floyd1 0.86798
## t_post_floyd 0.71014
## state_of_emerg1 0.40267
## stay_at_home1 0.70596
## uof_lag 9.55e-13 ***
## stops_lag 0.01119 *
## shoot_lag 0.65233
## tmax_f 0.42719
## snow_in 0.19748
## precip_in 8.66e-07 ***
## conc_dis 0.09517 .
## dplyr::lag(latin_mh_incid_c, 1) 0.80937
## dplyr::lag(latin_mh_incid_c, 2) 0.40800
## dplyr::lag(latin_mh_incid_c, 3) 0.62700
## post_floyd1:conc_dis 0.43792
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_int_blk_n1 <- lmer(black_mh_incid_c~t+t2+post_floyd+t_post_floyd+t_post_floyd2+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+conc_dis+
  post_floyd:conc_dis+
  dplyr::lag(black_mh_incid_c, 1)+ dplyr::lag(black_mh_incid_c, 2)+
  dplyr::lag(black_mh_incid_c, 3)+
  (1+post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_int_blk_n1)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## black_mh_incid_c ~ t + t2 + post_floyd + t_post_floyd + t_post_floyd2 +
## state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
## tmax_f + snow_in + precip_in + conc_dis + post_floyd:conc_dis +
## dplyr::lag(black_mh_incid_c, 1) + dplyr::lag(black_mh_incid_c,
## 2) + dplyr::lag(black_mh_incid_c, 3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 31523.9
```

```

##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.205 -0.166 -0.025  0.097 36.626
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)         1.6557   1.2867
##           post_floyd1         0.2282   0.4777   -1.00
## Residual                14.1070   3.7559
## Number of obs: 5720, groups: zcta, 22
##
## Fixed effects:
##                                Estimate Std. Error      df t value
## (Intercept)                   4.397e-01  3.551e-01  3.713e+01  1.238
## t                             9.899e-03  3.606e-03  5.698e+03  2.745
## t2                           -1.447e-05  1.571e-05  5.695e+03 -0.921
## post_floyd1                   3.006e+00  5.706e-01  2.003e+03  5.268
## t_post_floyd                 -1.981e-01  6.270e-02  5.674e+03 -3.160
## t_post_floyd2                4.109e-03  1.932e-03  5.674e+03  2.127
## state_of_emerg1              -1.920e+00  5.182e-01  5.675e+03 -3.706
## stay_at_home1                1.722e+00  5.244e-01  5.673e+03  3.283
## uof_lag                      -6.281e-02  1.986e-02  3.681e+03 -3.163
## stops_lag                    1.301e-02  9.349e-03  1.330e+03  1.392
## shoot_lag                    -1.865e+00  3.942e+00  5.676e+03 -0.473
## tmax_f                       -5.170e-04  2.943e-03  5.674e+03 -0.176
## snow_in                      -8.328e-02  1.442e-01  5.673e+03 -0.577
## precip_in                    -5.161e-01  4.846e-01  5.674e+03 -1.065
## conc_dis                     -7.508e-01  2.700e-01  2.055e+01 -2.781
## dplyr::lag(black_mh_incid_c, 1) -1.017e-02  1.325e-02  5.701e+03 -0.767
## dplyr::lag(black_mh_incid_c, 2)  2.048e-02  1.320e-02  5.699e+03  1.552
## dplyr::lag(black_mh_incid_c, 3)  4.249e-03  1.320e-02  5.700e+03  0.322
## post_floyd1:conc_dis          4.142e-02  1.860e-01  3.700e+01  0.223
##                                Pr(>|t|)
## (Intercept)                   0.223398
## t                             0.006065 **
## t2                             0.356879
## post_floyd1                   1.53e-07 ***
## t_post_floyd                 0.001586 **
## t_post_floyd2                0.033471 *
## state_of_emerg1              0.000213 ***
## stay_at_home1                0.001034 **
## uof_lag                      0.001573 **
## stops_lag                    0.164165
## shoot_lag                    0.636171
## tmax_f                       0.860579
## snow_in                      0.563697
## precip_in                    0.286951
## conc_dis                     0.011351 *
## dplyr::lag(black_mh_incid_c, 1) 0.443085
## dplyr::lag(black_mh_incid_c, 2) 0.120801
## dplyr::lag(black_mh_incid_c, 3) 0.747557
## post_floyd1:conc_dis          0.825010
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

```

```
re_int_white_nl <- lmer(white_mh_incid_c~t+t2+post_floyd+t_post_floyd+t_post_floyd2+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+conc_dis+
  post_floyd:conc_dis+
  dplyr::lag(white_mh_incid_c, 1)+ dplyr::lag(white_mh_incid_c, 2)+
  dplyr::lag(white_mh_incid_c, 3)+
  (1+post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_int_white_nl)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## white_mh_incid_c ~ t + t2 + post_floyd + t_post_floyd + t_post_floyd2 +
##   state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##   tmax_f + snow_in + precip_in + conc_dis + post_floyd:conc_dis +
##   dplyr::lag(white_mh_incid_c, 1) + dplyr::lag(white_mh_incid_c,
##   2) + dplyr::lag(white_mh_incid_c, 3) + (1 + post_floyd |      zcta)
## Data: panel
##
## REML criterion at convergence: 14546.1
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -5.1813 -0.2368 -0.0247  0.1964 16.0796
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)  0.94053   0.9698
##           post_floyd1  0.09952   0.3155   -1.00
## Residual                0.71293   0.8444
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)    1.879e-01  2.130e-01 1.662e+01  0.882
## t              7.819e-03  8.400e-04 5.699e+03  9.309
## t2            -2.207e-05  3.586e-06 5.681e+03 -6.154
## post_floyd1    -1.136e-01  1.429e-01 1.705e+02 -0.795
## t_post_floyd    5.328e-03  1.403e-02 5.672e+03  0.380
## t_post_floyd2  -4.393e-04  4.335e-04 5.672e+03 -1.013
## state_of_emerg1  4.497e-02  1.165e-01 5.675e+03  0.386
## stay_at_home1  -1.155e-01  1.178e-01 5.672e+03 -0.981
## uof_lag        -2.865e-02  4.566e-03 5.675e+03 -6.275
## stops_lag       5.131e-03  2.197e-03 4.884e+03  2.335
## shoot_lag      -6.744e-01  8.829e-01 5.673e+03 -0.764
## tmax_f          7.529e-04  6.618e-04 5.673e+03  1.138
## snow_in         5.550e-03  3.242e-02 5.672e+03  0.171
## precip_in      -4.040e-02  1.089e-01 5.673e+03 -0.371
## conc_dis       -6.360e-01  1.228e-01 1.433e+02 -5.179
## dplyr::lag(white_mh_incid_c, 1) -6.279e-03  1.314e-02 5.696e+03 -0.478
## dplyr::lag(white_mh_incid_c, 2)  2.819e-02  1.315e-02 5.695e+03  2.144
## dplyr::lag(white_mh_incid_c, 3) -7.469e-03  1.313e-02 5.695e+03 -0.569
## post_floyd1:conc_dis    3.362e-01  5.562e-02 6.133e+01  6.045
##
## Pr(>|t|)
```

```

## (Intercept)                0.3904
## t                          < 2e-16 ***
## t2                        8.08e-10 ***
## post_floyd1                0.4276
## t_post_floyd               0.7043
## t_post_floyd2              0.3109
## state_of_emerg1            0.6995
## stay_at_home1              0.3268
## uof_lag                    3.75e-10 ***
## stops_lag                   0.0196 *
## shoot_lag                   0.4450
## tmax_f                      0.2553
## snow_in                     0.8641
## precip_in                   0.7107
## conc_dis                    7.43e-07 ***
## dplyr::lag(white_mh_incid_c, 1) 0.6328
## dplyr::lag(white_mh_incid_c, 2) 0.0321 *
## dplyr::lag(white_mh_incid_c, 3) 0.5695
## post_floyd1:conc_dis          9.66e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_int_latin_nl <- lmer(latin_mh_incid_c~t+t2+post_floyd+t_post_floyd+t_post_floyd2+
                        state_of_emerg+stay_at_home+
                        uof_lag+stops_lag+shoot_lag+
                        tmax_f+snow_in+precip_in+conc_dis+
                        post_floyd:conc_dis+
                        dplyr::lag(latin_mh_incid_c, 1)+ dplyr::lag(latin_mh_incid_c, 2)+
                        dplyr::lag(latin_mh_incid_c, 3)+
                        (1+post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling

summary(re_int_latin_nl)

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## latin_mh_incid_c ~ t + t2 + post_floyd + t_post_floyd + t_post_floyd2 +
##   state_of_emerg + stay_at_home + uof_lag + stops_lag + shoot_lag +
##   tmax_f + snow_in + precip_in + conc_dis + post_floyd:conc_dis +
##   dplyr::lag(latin_mh_incid_c, 1) + dplyr::lag(latin_mh_incid_c,
##   2) + dplyr::lag(latin_mh_incid_c, 3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 40143.6
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -2.315 -0.083 -0.020  0.049 61.159
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)        3.5641   1.888
##           post_floyd1        0.1841   0.429   -1.00

```

```
## Residual          83.1889  9.121
## Number of obs: 5516, groups: zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)    -2.162e-01  7.054e-01  8.377e+01  -0.306
## t              2.111e-02  9.121e-03  5.481e+03   2.315
## t2            -6.233e-05  3.923e-05  5.488e+03  -1.589
## post_floyd1    -1.522e-01  1.365e+00  4.607e+03  -0.111
## t_post_floyd   5.502e-02  1.517e-01  5.464e+03   0.363
## t_post_floyd2  -8.102e-04  4.684e-03  5.463e+03  -0.173
## state_of_emerg1 -5.545e-01  1.259e+00  5.464e+03  -0.440
## stay_at_home1   5.765e-01  1.273e+00  5.463e+03   0.453
## uof_lag         5.147e-01  7.183e-02  4.413e+03   7.166
## stops_lag      -7.892e-02  2.809e-02  9.584e+01  -2.810
## shoot_lag      -4.443e+00  9.564e+00  5.469e+03  -0.465
## tmax_f         -7.401e-03  7.275e-03  5.468e+03  -1.017
## snow_in        -5.055e-01  3.535e-01  5.464e+03  -1.430
## precip_in       5.994e+00  1.204e+00  5.466e+03   4.976
## conc_dis       -7.793e-01  4.320e-01  1.319e+01  -1.804
## dplyr::lag(latin_mh_incid_c, 1) -3.588e-03  1.342e-02  5.493e+03  -0.267
## dplyr::lag(latin_mh_incid_c, 2) -1.149e-02  1.343e-02  5.494e+03  -0.856
## dplyr::lag(latin_mh_incid_c, 3) -6.874e-03  1.342e-02  5.493e+03  -0.512
## post_floyd1:conc_dis  3.123e-01  3.881e-01  1.318e+02   0.805
##
##              Pr(>|t|)
## (Intercept)          0.7600
## t                    0.0207 *
## t2                   0.1122
## post_floyd1          0.9113
## t_post_floyd         0.7168
## t_post_floyd2        0.8627
## state_of_emerg1      0.6597
## stay_at_home1        0.6507
## uof_lag              9.00e-13 ***
## stops_lag            0.0060 **
## shoot_lag            0.6423
## tmax_f               0.3091
## snow_in              0.1528
## precip_in            6.68e-07 ***
## conc_dis             0.0941 .
## dplyr::lag(latin_mh_incid_c, 1) 0.7892
## dplyr::lag(latin_mh_incid_c, 2) 0.3923
## dplyr::lag(latin_mh_incid_c, 3) 0.6086
## post_floyd1:conc_dis 0.4225
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

*#specifying varcov objects from model estimates*

```
var_re_white <- VarCorr(re_white)
var_re_white_nl <- VarCorr(re_white_nl)
var_re_int_white <- VarCorr(re_int_white)
var_re_int_white_nl <- VarCorr(re_int_white_nl)
var_re_black <- VarCorr(re_blk)
var_re_black_nl <- VarCorr(re_blk_nl)
var_re_int_black <- VarCorr(re_int_blk)
var_re_latian <- VarCorr(re_latian)
var_re_latian_nl <- VarCorr(re_latian_nl)
var_re_int_latian <- VarCorr(re_int_latian)
```

```

var_re_int_black_nl <- VarCorr(re_int_blk_nl)
var_re_int_latin_nl <- VarCorr(re_int_latin_nl)

class(re_white) <- "lmerMod"
class(re_blk) <- "lmerMod"
class(re_latin) <- "lmerMod"
class(re_int_blk) <- "lmerMod"
class(re_int_white) <- "lmerMod"
class(re_int_latin) <- "lmerMod"

class(re_white_nl) <- "lmerMod"
class(re_blk_nl) <- "lmerMod"
class(re_latin_nl) <- "lmerMod"
class(re_int_blk_nl) <- "lmerMod"
class(re_int_white_nl) <- "lmerMod"
class(re_int_latin_nl) <- "lmerMod"

library(patchwork)

(re_coef_map_white+re_coef_map_blk)/(re_coef_map_latin+cd_map)

```

Figure 3: RE Coefficients–White F

Rate per 1,000

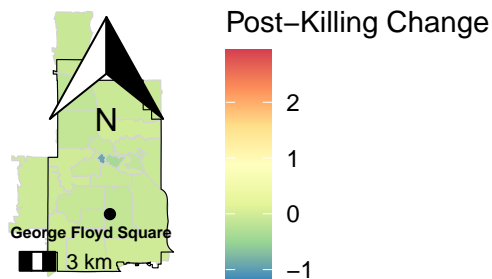


Figure 4: RE Coefficients–Black Reside

Rate per 1,000

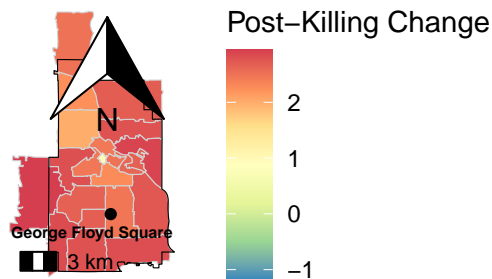


Figure 5: RE Coefficients–Latine I

Rate per 1,000

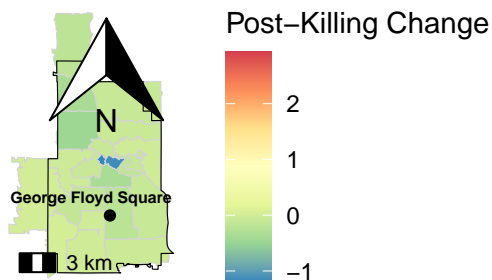
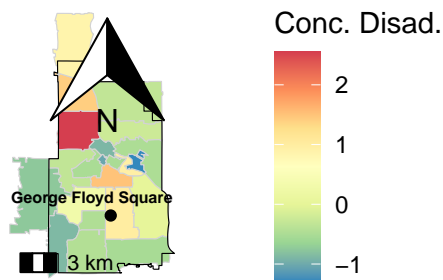


Figure 6: Concentrated Disadvantage

Standard Deviation Units



```

#RE random coefficient model
re_depress <- lmer(depress_incid_c~t+post_floyd+t_post_floyd+
                  state_of_emerg+stay_at_home+
                  uof_lag+stops_lag+shoot_lag+
                  tmax_f+snow_in+precip_in+
                  conc_dis+
                  dplyr::lag(depress_incid_c, 1)+ dplyr::lag(depress_incid_c, 2)+
                  dplyr::lag(depress_incid_c, 3)+
                  (post_floyd|zcta), data = panel)

```

## Warning: Some predictor variables are on very different scales: consider



```
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider  
## rescaling
```

```
summary(re_depress)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
## lmerModLmerTest]  
## Formula: depress_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +  
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +  
##   snow_in + precip_in + conc_dis + dplyr::lag(depress_incid_c,  
##   1) + dplyr::lag(depress_incid_c, 2) + dplyr::lag(depress_incid_c,  
##   3) + (post_floyd | zcta)  
## Data: panel  
##  
## REML criterion at convergence: 14185.8  
##  
## Scaled residuals:  
##      Min       1Q   Median       3Q      Max   
## -6.2064 -0.1911 -0.0244  0.1553 13.3774   
##  
## Random effects:  
## Groups   Name                Variance Std.Dev. Corr   
## zcta      (Intercept) 0.9935    0.9968   
##           post_floyd1 0.1837    0.4286  -1.00   
## Residual                0.6735    0.8207   
## Number of obs: 5720, groups: zcta, 22  
##  
## Fixed effects:  
##                                     Estimate Std. Error    df t value   
## (Intercept)                9.190e-01  2.180e-01 2.269e+01  4.216   
## t                        -2.067e-04  1.942e-04 5.640e+03 -1.064   
## post_floyd1                5.788e-02  1.458e-01 1.050e+02  0.397   
## t_post_floyd             -1.435e-02  3.586e-03 5.683e+03 -4.001   
## state_of_emerg1          -7.136e-02  1.078e-01 5.683e+03 -0.662   
## stay_at_home1            -1.565e-01  1.113e-01 5.683e+03 -1.406   
## uof_lag                   3.964e-03  4.427e-03 5.671e+03  0.895   
## stops_lag                 3.142e-03  2.092e-03 5.621e+03  1.502   
## shoot_lag                -2.411e-02  8.580e-01 5.683e+03 -0.028   
## tmax_f                    9.661e-05  6.323e-04 5.683e+03  0.153   
## snow_in                   3.065e-02  3.139e-02 5.683e+03  0.976   
## precip_in                 -6.959e-02  1.054e-01 5.683e+03 -0.660   
## conc_dis                  6.587e-02  5.986e-02 1.645e+02  1.101   
## dplyr::lag(depress_incid_c, 1) -3.512e-03  1.324e-02 5.704e+03 -0.265   
## dplyr::lag(depress_incid_c, 2)  2.352e-03  1.324e-02 5.704e+03  0.178   
## dplyr::lag(depress_incid_c, 3) -7.025e-04  1.324e-02 5.704e+03 -0.053   
##                                     Pr(>|t|)   
## (Intercept)                0.000337 ***   
## t                        0.287299   
## post_floyd1                0.692243   
## t_post_floyd                6.4e-05 ***   
## state_of_emerg1            0.507896   
## stay_at_home1              0.159873   
## uof_lag                    0.370582   
## stops_lag                  0.133241   
## shoot_lag                  0.977582   
## tmax_f                     0.878568   
## snow_in                    0.328913   
## precip_in                  0.509030   
## conc_dis                   0.272717   
## dplyr::lag(depress_incid_c, 1) 0.790773
```

```
## dplyr::lag(depress_incid_c, 2) 0.859029
## dplyr::lag(depress_incid_c, 3) 0.957673
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_blk_depress <- lmer(black_depress_incid_c~t+post_floyd+t_post_floyd+
                      state_of_emerg+stay_at_home+
                      uof_lag+stops_lag+shoot_lag+
                      tmax_f+snow_in+precip_in+
                      conc_dis+
                      dplyr::lag(black_depress_incid_c, 1)+ dplyr::lag(black_depress_incid_c, 2)+
                      dplyr::lag(black_depress_incid_c, 3)+
                      (post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_blk_depress)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## black_depress_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + dplyr::lag(black_depress_incid_c,
## 1) + dplyr::lag(black_depress_incid_c, 2) + dplyr::lag(black_depress_incid_c,
## 3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 29871.7
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -2.261 -0.127 -0.035  0.053 41.953
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)    0.09577 0.3095
##           post_floyd1    0.16808 0.4100  1.00
## Residual                    10.68362 3.2686
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)   3.305e-01  1.851e-01 3.910e+02  1.785
## t             2.379e-03  7.676e-04 5.686e+03  3.099
## post_floyd1   2.461e+00  4.610e-01 1.703e+03  5.337
## t_post_floyd -4.840e-02  1.429e-02 5.683e+03 -3.387
## state_of_emerg -1.930e+00  4.291e-01 5.682e+03 -4.497
## stay_at_home1  2.185e+00  4.432e-01 5.682e+03  4.929
## uof_lag        2.626e-02  1.563e-02 1.217e+03  1.680
## stops_lag      2.173e-02  6.076e-03 1.823e+02  3.576
## shoot_lag      -7.988e-01  3.433e+00 5.690e+03 -0.233
## tmax_f         -2.291e-03  2.517e-03 5.683e+03 -0.910
## snow_in        -1.015e-01  1.250e-01 5.681e+03 -0.811
## precip_in      -4.275e-01  4.198e-01 5.681e+03 -1.018
```

```
## conc_dis -1.622e-01 8.170e-02 1.776e+01 -1.985
## dplyr::lag(black_depress_incid_c, 1) -7.338e-03 1.325e-02 5.642e+03 -0.554
## dplyr::lag(black_depress_incid_c, 2) 2.738e-02 1.318e-02 5.657e+03 2.077
## dplyr::lag(black_depress_incid_c, 3) 2.595e-04 1.318e-02 5.635e+03 0.020
## Pr(>|t|)
## (Intercept) 0.074958 .
## t 0.001949 **
## post_floyd1 1.07e-07 ***
## t_post_floyd 0.000710 ***
## state_of_emerg1 7.03e-06 ***
## stay_at_home1 8.52e-07 ***
## uof_lag 0.093238 .
## stops_lag 0.000447 ***
## shoot_lag 0.816025
## tmax_f 0.362779
## snow_in 0.417160
## precip_in 0.308554
## conc_dis 0.062786 .
## dplyr::lag(black_depress_incid_c, 1) 0.579802
## dplyr::lag(black_depress_incid_c, 2) 0.037830 *
## dplyr::lag(black_depress_incid_c, 3) 0.984296
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
re_white_depress <- lmer(white_depress_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  conc_dis+
  dplyr::lag(white_depress_incid_c, 1)+ dplyr::lag(white_depress_incid_c, 2)+
  dplyr::lag(white_depress_incid_c, 3)+
  (post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_white_depress)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## white_depress_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
## stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
## snow_in + precip_in + conc_dis + dplyr::lag(white_depress_incid_c,
## 1) + dplyr::lag(white_depress_incid_c, 2) + dplyr::lag(white_depress_incid_c,
## 3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 9577.9
##
## Scaled residuals:
## Min 1Q Median 3Q Max
## -4.1828 -0.2302 -0.0422 0.1576 27.6251
##
## Random effects:
## Groups Name Variance Std.Dev. Corr
```

```
## zcta      (Intercept) 0.044117 0.21004
##          post_floyd1 0.001872 0.04327 -1.00
## Residual          0.302874 0.55034
## Number of obs: 5720, groups: zcta, 22
##
## Fixed effects:
##
##          Estimate Std. Error      df t value
## (Intercept)      1.237e-01  5.357e-02  3.358e+01  2.310
## t                1.140e-03  1.335e-04  5.547e+03  8.534
## post_floyd1      -7.420e-03  7.677e-02  3.163e+03 -0.097
## t_post_floyd     -4.683e-03  2.398e-03  5.682e+03 -1.953
## state_of_emerg1  -7.130e-02  7.230e-02  5.681e+03 -0.986
## stay_at_home1    -1.732e-02  7.461e-02  5.681e+03 -0.232
## uof_lag           6.328e-04  2.920e-03  4.265e+03  0.217
## stops_lag        1.307e-02  1.342e-03  1.747e+03  9.733
## shoot_lag        -4.490e-02  5.754e-01  5.682e+03 -0.078
## tmax_f           7.173e-04  4.244e-04  5.682e+03  1.690
## snow_in          -1.252e-02  2.105e-02  5.681e+03 -0.595
## precip_in        -4.078e-02  7.066e-02  5.681e+03 -0.577
## conc_dis         2.620e-04  3.770e-02  2.789e+01  0.007
## dplyr::lag(white_depress_incid_c, 1) 1.439e-03  1.313e-02  5.653e+03  0.110
## dplyr::lag(white_depress_incid_c, 2) 6.374e-03  1.314e-02  5.670e+03  0.485
## dplyr::lag(white_depress_incid_c, 3) 5.711e-03  1.313e-02  5.661e+03  0.435
##
##          Pr(>|t|)
## (Intercept)      0.0272 *
## t                <2e-16 ***
## post_floyd1      0.9230
## t_post_floyd     0.0509 .
## state_of_emerg1  0.3241
## stay_at_home1    0.8164
## uof_lag          0.8284
## stops_lag        <2e-16 ***
## shoot_lag        0.9378
## tmax_f           0.0910 .
## snow_in          0.5522
## precip_in        0.5639
## conc_dis         0.9945
## dplyr::lag(white_depress_incid_c, 1) 0.9127
## dplyr::lag(white_depress_incid_c, 2) 0.6276
## dplyr::lag(white_depress_incid_c, 3) 0.6636
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_latin_depress <- lmer(latin_depress_incid_c~t+post_floyd+t_post_floyd+
                        state_of_emerg+stay_at_home+
                        uof_lag+stops_lag+shoot_lag+
                        tmax_f+snow_in+precip_in+
                        conc_dis+
                        dplyr::lag(latin_depress_incid_c, 1)+ dplyr::lag(latin_depress_incid_c, 2)+
                        dplyr::lag(latin_depress_incid_c, 3)+
                        (post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_latin_depress)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## latin_depress_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + dplyr::lag(latin_depress_incid_c,
##   1) + dplyr::lag(latin_depress_incid_c, 2) + dplyr::lag(latin_depress_incid_c,
##   3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 17615.2
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -3.6546 -0.2031 -0.0913  0.0418 23.4282
##
## Random effects:
##   Groups      Name      Variance Std.Dev. Corr
##   zcta      (Intercept) 0.1038   0.3221
##             post_floyd1 0.3339   0.5779  -0.90
## Residual                1.3860   1.1773
## Number of obs: 5516, groups:  zcta, 22
##
## Fixed effects:
##                                     Estimate Std. Error      df t value
## (Intercept)                      -1.230e-01  9.464e-02  5.055e+01  -1.300
## t                                2.013e-03  2.913e-04  5.484e+03   6.910
## post_floyd1                      1.987e-01  2.045e-01  1.111e+02   0.972
## t_post_floyd                     -5.734e-03  5.134e-03  5.460e+03  -1.117
## state_of_emerg1                  -2.913e-01  1.549e-01  5.461e+03  -1.881
## stay_at_home1                    2.588e-02  1.597e-01  5.458e+03   0.162
## uof_lag                          1.058e-01  9.242e-03  4.271e+03  11.453
## stops_lag                        9.285e-04  3.697e-03  1.784e+02   0.251
## shoot_lag                       -8.141e-01  1.234e+00  5.468e+03  -0.660
## tmax_f                          1.346e-03  9.242e-04  5.465e+03   1.456
## snow_in                         5.841e-02  4.549e-02  5.458e+03   1.284
## precip_in                       -2.078e-01  1.536e-01  5.459e+03  -1.352
## conc_dis                        -4.494e-02  3.868e-02  1.732e+01  -1.162
## dplyr::lag(latin_depress_incid_c, 1) -5.473e-03  1.329e-02  5.321e+03  -0.412
## dplyr::lag(latin_depress_incid_c, 2) -1.681e-03  1.331e-02  5.327e+03  -0.126
## dplyr::lag(latin_depress_incid_c, 3) -6.025e-03  1.329e-02  5.320e+03  -0.453
##                                     Pr(>|t|)
## (Intercept)                        0.200
## t                                5.38e-12 ***
## post_floyd1                       0.333
## t_post_floyd                      0.264
## state_of_emerg1                   0.060 .
## stay_at_home1                     0.871
## uof_lag                           < 2e-16 ***
## stops_lag                         0.802
## shoot_lag                         0.510
## tmax_f                            0.145
## snow_in                           0.199
## precip_in                         0.176
## conc_dis                          0.261
## dplyr::lag(latin_depress_incid_c, 1) 0.681
## dplyr::lag(latin_depress_incid_c, 2) 0.900
## dplyr::lag(latin_depress_incid_c, 3) 0.650
## ---
```

```

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling

#extract random coefficients
re_pf_white_depress <- as.data.frame(coef(re_white_depress)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_white = post_floyd1)

re_pf_blk_depress <- as.data.frame(coef(re_blk_depress)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_blk = post_floyd1)

re_pf_latin_depress <- as.data.frame(coef(re_latin_depress)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_latin = post_floyd1)

#aggregate to zip-level over years
zip_level_depress <- panel %>%
  group_by(zcta) %>%
  summarize(mh_all_tot = sum(mh_all_tot, na.rm = T),
            total_pop = sum(total_pop, na.rm = T),
            conc_dis = mean(conc_dis, na.rm = T)) %>%
  mutate(mh_incid_c = (mh_all_tot/total_pop)*1000) %>%
  ungroup() %>%
  left_join(zcta, by = "zcta")

zip_level_depress <- zip_level_depress %>%
  left_join(re_pf_white_depress, by = c("zcta" = "zipcode")) %>%
  left_join(re_pf_blk_depress, by = c("zcta" = "zipcode")) %>%
  left_join(re_pf_latin_depress, by = c("zcta" = "zipcode"))

re_coef_map_white_depress <- ggplot() +
  geom_sf(data = zip_level_depress, aes(geometry = geometry, fill = post_floyd1_white), color = "lightgrey") +
  geom_sf(data = mpls, aes(geometry = geometry), color = "black", alpha = 0) +
  geom_sf(data = gfs, aes(geometry = geometry), color = "black") +
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold") +
  scale_fill_distiller(palette = "Spectral",
                       limits = c(min(zip_level_depress$post_floyd1_latin),
                                   max(zip_level_depress$post_floyd1_blk))) +
  labs(title = "Figure A3: RE Coefficients-White Residents",
        subtitle = "Rate per 1,000",
        fill = "Post-Killing Change") +
  theme(axis.text.x = element_blank(),
        axis.text.y = element_blank(),
        axis.line = element_blank(),
        axis.ticks = element_blank(),
        panel.border = element_blank(),
        panel.grid = element_blank(),
        axis.title = element_blank(),
        panel.background = element_blank(),
        panel.grid.major = element_line(colour="transparent"),
        plot.subtitle = element_text(face="italic"),

```

```

strip.background = element_rect(fill = "white",
                                colour = "black"))+
ggspatial::annotation_scale()+
ggspatial::annotation_north_arrow(which_north = "true",
                                location = "tr")

re_coef_map_blk_depress <- ggplot() +
  geom_sf(data = zip_level_depress, aes(geometry = geometry, fill = post_floyd1_blk), color = "lightgrey") +
  geom_sf(data = mpls, aes(geometry = geometry), color = "black", alpha = 0)+
  geom_sf(data = gfs, aes(geometry = geometry), color = "black")+
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold")+
scale_fill_distiller(palette = "Spectral",
                     limits = c(min(zip_level_depress$post_floyd1_latin),
                                max(zip_level_depress$post_floyd1_blk)))+
labs(title = "Figure A4: RE Coefficients-Black Residents",
     subtitle = "Rate per 1,000",
     fill = "Post-Killing Change")+
theme(axis.text.x = element_blank(),
      axis.text.y = element_blank(),
      axis.line = element_blank(),
      axis.ticks = element_blank(),
      panel.border = element_blank(),
      panel.grid = element_blank(),
      axis.title = element_blank(),
      panel.background = element_blank(),
      panel.grid.major = element_line(colour="transparent"),
      plot.subtitle = element_text(face="italic"),
      strip.background = element_rect(fill = "white",
                                      colour = "black"))+
ggspatial::annotation_scale()+
ggspatial::annotation_north_arrow(which_north = "true",
                                location = "tr")

re_coef_map_latin_depress <- ggplot() +
  geom_sf(data = zip_level_depress, aes(geometry = geometry, fill = post_floyd1_latin), color = "lightgrey") +
  geom_sf(data = mpls, aes(geometry = geometry), color = "black", alpha = 0)+
  geom_sf(data = gfs, aes(geometry = geometry), color = "black")+
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold")+
scale_fill_distiller(palette = "Spectral",
                     limits = c(min(zip_level_depress$post_floyd1_latin),
                                max(zip_level_depress$post_floyd1_blk)))+
labs(title = "Figure A5: RE Coefficients-Latine Residents",
     subtitle = "Rate per 1,000",
     fill = "Post-Killing Change")+
theme(axis.text.x = element_blank(),
      axis.text.y = element_blank(),
      axis.line = element_blank(),
      axis.ticks = element_blank(),
      panel.border = element_blank(),
      panel.grid = element_blank(),
      axis.title = element_blank(),
      panel.background = element_blank(),
      panel.grid.major = element_line(colour="transparent"),
      plot.subtitle = element_text(face="italic"),
      strip.background = element_rect(fill = "white",
                                      colour = "black"))+
ggspatial::annotation_scale()+

```



```

ggspatial::annotation_north_arrow(which_north = "true",
                                   location = "tr")

#RE random coefficient model - interaction
re_int_depress <- lmer(depress_incid_c~t+post_floyd+t_post_floyd+
                      state_of_emerg+stay_at_home+
                      uof_lag+stops_lag+shoot_lag+
                      tmax_f+snow_in+precip_in+conc_dis+
                      post_floyd:conc_dis+
                      dplyr::lag(depress_incid_c, 1)+ dplyr::lag(depress_incid_c, 2)+
                      dplyr::lag(depress_incid_c, 3)+
                      (1+post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling

summary(re_int_depress)

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: depress_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##      stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##      snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(depress_incid_c,
##      1) + dplyr::lag(depress_incid_c, 2) + dplyr::lag(depress_incid_c,
##      3) + (1 + post_floyd | zcta)
##      Data: panel
##
## REML criterion at convergence: 14183.6
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -6.1963 -0.1897 -0.0260  0.1564 13.3722
##
## Random effects:
##      Groups      Name              Variance Std.Dev. Corr
##      zcta      (Intercept)  1.1265     1.0614
##      post_floyd1 0.2104     0.4587    -1.00
##      Residual          0.6726     0.8201
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)    9.029e-01  2.315e-01  2.101e+01   3.900
## t              -9.307e-05  1.995e-04  5.293e+03  -0.467
## post_floyd1     4.998e-02  1.499e-01  8.591e+01   0.333
## t_post_floyd   -1.451e-02  3.585e-03  5.683e+03  -4.047
## state_of_emerg1 -6.733e-02  1.077e-01  5.682e+03  -0.625
## stay_at_home1  -1.575e-01  1.113e-01  5.681e+03  -1.416
## uof_lag         3.112e-03  4.435e-03  5.676e+03   0.702
## stops_lag       3.847e-03  2.117e-03  5.503e+03   1.817
## shoot_lag      -4.723e-02  8.575e-01  5.681e+03  -0.055
## tmax_f          8.347e-05  6.319e-04  5.681e+03   0.132
## snow_in         3.081e-02  3.137e-02  5.681e+03   0.982
## precip_in      -7.265e-02  1.053e-01  5.681e+03  -0.690
## conc_dis        3.346e-01  1.253e-01  2.483e+02   2.671
## dplyr::lag(depress_incid_c, 1) -3.595e-03  1.323e-02  5.703e+03  -0.272
## dplyr::lag(depress_incid_c, 2)  2.015e-03  1.324e-02  5.703e+03   0.152
## dplyr::lag(depress_incid_c, 3)  1.017e-04  1.323e-02  5.703e+03   0.008

```

```
## post_floyd1:conc_dis      -1.620e-01  6.631e-02  1.190e+02  -2.443
##                               Pr(>|t|)
## (Intercept)              0.000825 ***
## t                        0.640813
## post_floyd1              0.739647
## t_post_floyd             5.26e-05 ***
## state_of_emerg1          0.531943
## stay_at_home1            0.156946
## uof_lag                   0.482989
## stops_lag                 0.069256 .
## shoot_lag                 0.956076
## tmax_f                    0.894923
## snow_in                   0.326156
## precip_in                 0.490310
## conc_dis                  0.008056 **
## dplyr::lag(depress_incid_c, 1) 0.785869
## dplyr::lag(depress_incid_c, 2) 0.879023
## dplyr::lag(depress_incid_c, 3) 0.993872
## post_floyd1:conc_dis          0.016035 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
re_int_blk_depress <- lmer(black_depress_incid_c~t+post_floyd+t_post_floyd+
                           state_of_emerg+stay_at_home+
                           uof_lag+stops_lag+shoot_lag+
                           tmax_f+snow_in+precip_in+conc_dis+
                           post_floyd:conc_dis+
                           dplyr::lag(black_depress_incid_c, 1)+ dplyr::lag(black_depress_incid_c, 2)+
                           dplyr::lag(black_depress_incid_c, 3)+
                           (1+post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_int_blk_depress)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## black_depress_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(black_depress_incid_c,
##   1) + dplyr::lag(black_depress_incid_c, 2) + dplyr::lag(black_depress_incid_c,
##   3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 29872.3
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -2.285 -0.126 -0.035  0.051  41.917
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)    0.09446  0.3073
##   post_floyd1 0.16207  0.4026    1.00
```

```
## Residual          10.68358 3.2686
## Number of obs: 5720, groups: zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)    3.315e-01  1.849e-01  3.997e+02   1.792
## t              2.367e-03  7.676e-04  5.691e+03   3.084
## post_floyd1    2.452e+00  4.608e-01  1.728e+03   5.323
## t_post_floyd   -4.842e-02  1.429e-02  5.682e+03  -3.389
## state_of_emerg1 -1.929e+00  4.291e-01  5.681e+03  -4.496
## stay_at_home1   2.185e+00  4.432e-01  5.681e+03   4.929
## uof_lag         2.664e-02  1.563e-02  1.206e+03   1.704
## stops_lag       2.196e-02  6.078e-03  1.799e+02   3.613
## shoot_lag      -8.137e-01  3.433e+00  5.689e+03  -0.237
## tmax_f         -2.294e-03  2.517e-03  5.683e+03  -0.911
## snow_in        -1.015e-01  1.250e-01  5.681e+03  -0.812
## precip_in      -4.275e-01  4.198e-01  5.681e+03  -1.018
## conc_dis       -1.858e-01  8.389e-02  1.651e+01  -2.216
## dplyr::lag(black_depress_incid_c, 1) -7.474e-03  1.325e-02  5.641e+03  -0.564
## dplyr::lag(black_depress_incid_c, 2)  2.714e-02  1.318e-02  5.655e+03   2.059
## dplyr::lag(black_depress_incid_c, 3)  1.421e-04  1.318e-02  5.634e+03   0.011
## post_floyd1:conc_dis -1.806e-01  1.563e-01  3.537e+01  -1.156
##
##              Pr(>|t|)
## (Intercept)    0.073820 .
## t              0.002055 **
## post_floyd1    1.16e-07 ***
## t_post_floyd   0.000706 ***
## state_of_emerg1 7.05e-06 ***
## stay_at_home1   8.51e-07 ***
## uof_lag         0.088649 .
## stops_lag       0.000393 ***
## shoot_lag       0.812657
## tmax_f          0.362203
## snow_in         0.416891
## precip_in       0.308515
## conc_dis        0.041099 *
## dplyr::lag(black_depress_incid_c, 1) 0.572793
## dplyr::lag(black_depress_incid_c, 2) 0.039544 *
## dplyr::lag(black_depress_incid_c, 3) 0.991402
## post_floyd1:conc_dis 0.255599
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_int_white_depress <- lmer(white_depress_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+conc_dis+
  post_floyd:conc_dis+
  dplyr::lag(white_depress_incid_c, 1)+ dplyr::lag(white_depress_incid_c, 2)+
  dplyr::lag(white_depress_incid_c, 3)+
  (1+post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_int_white_depress)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## white_depress_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(white_depress_incid_c,
##   1) + dplyr::lag(white_depress_incid_c, 2) + dplyr::lag(white_depress_incid_c,
##   3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 9579.3
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -4.1613 -0.2314 -0.0422  0.1553 27.6572
##
## Random effects:
##   Groups      Name      Variance Std.Dev. Corr
##   zcta      (Intercept) 0.051044 0.22593
##             post_floyd1 0.003055 0.05527  -1.00
## Residual              0.302558 0.55005
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##                                     Estimate Std. Error      df t value
## (Intercept)                      1.274e-01  5.645e-02  2.629e+01   2.257
## t                                1.122e-03  1.339e-04  5.303e+03   8.385
## post_floyd1                      -5.622e-03  7.709e-02  2.302e+03  -0.073
## t_post_floyd                     -4.639e-03  2.396e-03  5.678e+03  -1.936
## state_of_emerg1                  -7.261e-02  7.226e-02  5.677e+03  -1.005
## stay_at_home1                   -1.741e-02  7.458e-02  5.676e+03  -0.233
## uof_lag                          3.143e-04  2.926e-03  4.361e+03   0.107
## stops_lag                        1.255e-02  1.357e-03  1.711e+03   9.244
## shoot_lag                       -3.577e-02  5.751e-01  5.677e+03  -0.062
## tmax_f                           7.243e-04  4.242e-04  5.678e+03   1.708
## snow_in                         -1.255e-02  2.104e-02  5.676e+03  -0.596
## precip_in                       -4.007e-02  7.062e-02  5.677e+03  -0.567
## conc_dis                        -4.963e-02  4.534e-02  2.461e+01  -1.095
## dplyr::lag(white_depress_incid_c, 1) 1.201e-03  1.314e-02  5.672e+03   0.091
## dplyr::lag(white_depress_incid_c, 2) 7.071e-03  1.314e-02  5.678e+03   0.538
## dplyr::lag(white_depress_incid_c, 3) 5.459e-03  1.313e-02  5.673e+03   0.416
## post_floyd1:conc_dis              5.397e-02  2.567e-02  5.198e+01   2.103
##                                     Pr(>|t|)
## (Intercept)                      0.0326 *
## t                                <2e-16 ***
## post_floyd1                      0.9419
## t_post_floyd                     0.0529 .
## state_of_emerg1                  0.3150
## stay_at_home1                   0.8154
## uof_lag                         0.9145
## stops_lag                       <2e-16 ***
## shoot_lag                       0.9504
## tmax_f                          0.0878 .
## snow_in                         0.5510
## precip_in                       0.5705
## conc_dis                        0.2842
## dplyr::lag(white_depress_incid_c, 1) 0.9271
## dplyr::lag(white_depress_incid_c, 2) 0.5907
## dplyr::lag(white_depress_incid_c, 3) 0.6777
```

```
## post_floyd1:conc_dis          0.0404 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
re_int_latin_depress <- lmer(latin_depress_incid_c~t+post_floyd+t_post_floyd+
                             state_of_emerg+stay_at_home+
                             uof_lag+stops_lag+shoot_lag+
                             tmax_f+snow_in+precip_in+conc_dis+
                             post_floyd:conc_dis+
                             dplyr::lag(latin_depress_incid_c, 1)+ dplyr::lag(latin_depress_incid_c, 2)+
                             dplyr::lag(latin_depress_incid_c, 3)+
                             (1+post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_int_latin_depress)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## latin_depress_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(latin_depress_incid_c,
##   1) + dplyr::lag(latin_depress_incid_c, 2) + dplyr::lag(latin_depress_incid_c,
##   3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 17617.2
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -3.6587 -0.2028 -0.0917  0.0426 23.4236
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)  0.116      0.3406
##           post_floyd1  0.374      0.6115  -0.91
## Residual                1.386      1.1771
## Number of obs: 5516, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept) -1.230e-01  9.759e-02 3.648e+01 -1.260
## t            2.000e-03  2.923e-04 5.370e+03  6.843
## post_floyd1  2.031e-01  2.090e-01 8.255e+01  0.972
## t_post_floyd -5.728e-03  5.134e-03 5.458e+03 -1.116
## state_of_emerg1 -2.912e-01  1.548e-01 5.459e+03 -1.881
## stay_at_home1  2.596e-02  1.597e-01 5.455e+03  0.163
## uof_lag       1.060e-01  9.239e-03 4.253e+03 11.469
## stops_lag     1.372e-03  3.716e-03 1.738e+02  0.369
## shoot_lag     -8.116e-01  1.234e+00 5.464e+03 -0.658
## tmax_f        1.344e-03  9.241e-04 5.462e+03  1.455
## snow_in       5.846e-02  4.548e-02 5.455e+03  1.285
## precip_in     -2.077e-01  1.536e-01 5.455e+03 -1.352
## conc_dis      -7.932e-02  7.411e-02 1.616e+01 -1.070
```

```
## dplyr::lag(latin_depress_incid_c, 1) -5.497e-03 1.329e-02 5.306e+03 -0.414
## dplyr::lag(latin_depress_incid_c, 2) -1.767e-03 1.331e-02 5.312e+03 -0.133
## dplyr::lag(latin_depress_incid_c, 3) -6.172e-03 1.329e-02 5.311e+03 -0.464
## post_floyd1:conc_dis 7.334e-02 1.359e-01 2.004e+01 0.540
## Pr(>|t|)
## (Intercept) 0.2157
## t 8.64e-12 ***
## post_floyd1 0.3340
## t_post_floyd 0.2646
## state_of_emerg1 0.0601 .
## stay_at_home1 0.8708
## uof_lag < 2e-16 ***
## stops_lag 0.7125
## shoot_lag 0.5108
## tmax_f 0.1458
## snow_in 0.1987
## precip_in 0.1763
## conc_dis 0.3002
## dplyr::lag(latin_depress_incid_c, 1) 0.6792
## dplyr::lag(latin_depress_incid_c, 2) 0.8944
## dplyr::lag(latin_depress_incid_c, 3) 0.6424
## post_floyd1:conc_dis 0.5954
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
```

*#specifying varcov objects from model estimates*

```
var_re_white_depress <- VarCorr(re_white_depress)
var_re_int_white_depress <- VarCorr(re_int_white_depress)
var_re_black_depress <- VarCorr(re_blk_depress)
var_re_int_black_depress <- VarCorr(re_int_blk_depress)
var_re_latin_depress <- VarCorr(re_latin_depress)
var_re_int_latin_depress <- VarCorr(re_int_latin_depress)
class(re_white_depress) <- "lmerMod"
class(re_blk_depress) <- "lmerMod"
class(re_latin_depress) <- "lmerMod"
class(re_int_blk_depress) <- "lmerMod"
class(re_int_white_depress) <- "lmerMod"
class(re_int_blk_depress) <- "lmerMod"
class(re_int_latin_depress) <- "lmerMod"
```

```
(re_coef_map_white_depress+re_coef_map_blk_depress)/(re_coef_map_latin_depress+cd_map)
```

Figure A3: RE Coefficients–White  
Rate per 1,000

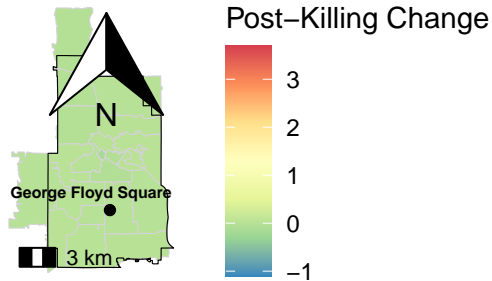


Figure A4: RE Coefficients–Black Resic  
Rate per 1,000

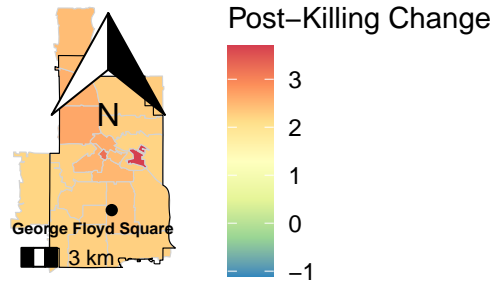


Figure A5: RE Coefficients–Latine  
Rate per 1,000

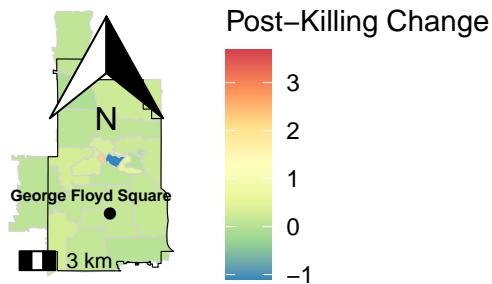
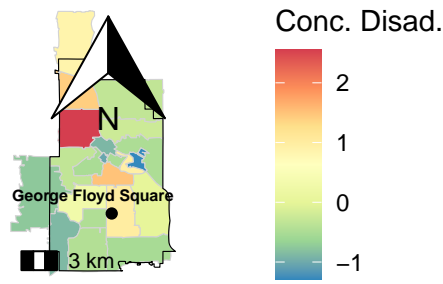


Figure 6: Concentrated Disadvantage  
Standard Deviation Units



```
#RE random coefficient model
re_anxiety <- lmer(depress_incid_c~t+post_floyd+t_post_floyd+
                  state_of_emerg+stay_at_home+
                  uof_lag+stops_lag+shoot_lag+
                  tmax_f+snow_in+precip_in+
                  conc_dis+
                  dplyr::lag(depress_incid_c, 1)+ dplyr::lag(depress_incid_c, 2)+
                  dplyr::lag(depress_incid_c, 3)+
                  (post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_anxiety)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: depress_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
## stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
## snow_in + precip_in + conc_dis + dplyr::lag(depress_incid_c,
## 1) + dplyr::lag(depress_incid_c, 2) + dplyr::lag(depress_incid_c,
## 3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 14185.8
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -6.2064 -0.1911 -0.0244  0.1553 13.3774
##
## Random effects:
```



```
## Groups      Name      Variance Std.Dev. Corr
## zcta        (Intercept) 0.9935   0.9968
##             post_floyd1 0.1837   0.4286  -1.00
## Residual                0.6735   0.8207
## Number of obs: 5720, groups: zcta, 22
##
## Fixed effects:
##
##             Estimate Std. Error      df t value
## (Intercept)      9.190e-01  2.180e-01  2.269e+01  4.216
## t                -2.067e-04  1.942e-04  5.640e+03  -1.064
## post_floyd1       5.788e-02  1.458e-01  1.050e+02   0.397
## t_post_floyd     -1.435e-02  3.586e-03  5.683e+03  -4.001
## state_of_emerg1  -7.136e-02  1.078e-01  5.683e+03  -0.662
## stay_at_home1    -1.565e-01  1.113e-01  5.683e+03  -1.406
## uof_lag           3.964e-03  4.427e-03  5.671e+03   0.895
## stops_lag         3.142e-03  2.092e-03  5.621e+03   1.502
## shoot_lag        -2.411e-02  8.580e-01  5.683e+03  -0.028
## tmax_f            9.661e-05  6.323e-04  5.683e+03   0.153
## snow_in           3.065e-02  3.139e-02  5.683e+03   0.976
## precip_in        -6.959e-02  1.054e-01  5.683e+03  -0.660
## conc_dis          6.587e-02  5.986e-02  1.645e+02   1.101
## dplyr::lag(depress_incid_c, 1) -3.512e-03  1.324e-02  5.704e+03  -0.265
## dplyr::lag(depress_incid_c, 2)  2.352e-03  1.324e-02  5.704e+03   0.178
## dplyr::lag(depress_incid_c, 3) -7.025e-04  1.324e-02  5.704e+03  -0.053
##
##             Pr(>|t|)
## (Intercept)      0.000337 ***
## t                0.287299
## post_floyd1       0.692243
## t_post_floyd       6.4e-05 ***
## state_of_emerg1    0.507896
## stay_at_home1      0.159873
## uof_lag            0.370582
## stops_lag          0.133241
## shoot_lag          0.977582
## tmax_f             0.878568
## snow_in            0.328913
## precip_in          0.509030
## conc_dis           0.272717
## dplyr::lag(depress_incid_c, 1) 0.790773
## dplyr::lag(depress_incid_c, 2) 0.859029
## dplyr::lag(depress_incid_c, 3) 0.957673
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_blk_anxiety <- lmer(black_anxiety_incid_c~t+post_floyd+t_post_floyd+
                      state_of_emerg+stay_at_home+
                      uof_lag+stops_lag+shoot_lag+
                      tmax_f+snow_in+precip_in+
                      conc_dis+
                      dplyr::lag(black_anxiety_incid_c, 1)+ dplyr::lag(black_anxiety_incid_c, 2)+
                      dplyr::lag(black_anxiety_incid_c, 3)+
                      (post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_blk_anxiety)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## black_anxiety_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + dplyr::lag(black_anxiety_incid_c,
##   1) + dplyr::lag(black_anxiety_incid_c, 2) + dplyr::lag(black_anxiety_incid_c,
##   3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 22842.4
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -1.938 -0.174 -0.074  0.054 56.324
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta      (Intercept)  0.000      0.00
##             post_floyd1  0.000      0.00      NaN
## Residual                3.134      1.77
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##                                     Estimate Std. Error      df t value
## (Intercept)                   1.273e-01  9.357e-02  5.704e+03   1.360
## t                             1.499e-03  4.159e-04  5.704e+03   3.605
## post_floyd1                   1.958e-02  2.450e-01  5.704e+03   0.080
## t_post_floyd                 -1.217e-02  7.708e-03  5.704e+03  -1.579
## state_of_emerg1              -4.604e-02  2.324e-01  5.704e+03  -0.198
## stay_at_home1               -1.311e-01  2.400e-01  5.704e+03  -0.546
## uof_lag                      9.182e-03  7.969e-03  5.704e+03   1.152
## stops_lag                    2.865e-02  2.846e-03  5.704e+03  10.068
## shoot_lag                   -2.957e-02  1.847e+00  5.704e+03  -0.016
## tmax_f                      -1.311e-04  1.363e-03  5.704e+03  -0.096
## snow_in                     5.134e-02  6.771e-02  5.704e+03   0.758
## precip_in                   -4.894e-01  2.275e-01  5.704e+03  -2.151
## conc_dis                    -6.066e-02  2.486e-02  5.704e+03  -2.440
## dplyr::lag(black_anxiety_incid_c, 1) -5.656e-03  1.306e-02  5.704e+03  -0.433
## dplyr::lag(black_anxiety_incid_c, 2) -1.078e-02  1.307e-02  5.704e+03  -0.824
## dplyr::lag(black_anxiety_incid_c, 3) -2.079e-03  1.305e-02  5.704e+03  -0.159
##                                     Pr(>|t|)
## (Intercept)                   0.173728
## t                             0.000315 ***
## post_floyd1                   0.936317
## t_post_floyd                  0.114371
## state_of_emerg1              0.842976
## stay_at_home1                0.584960
## uof_lag                      0.249265
## stops_lag                    < 2e-16 ***
## shoot_lag                    0.987225
## tmax_f                      0.923363
## snow_in                     0.448356
## precip_in                    0.031484 *
## conc_dis                     0.014700 *
## dplyr::lag(black_anxiety_incid_c, 1) 0.664877
## dplyr::lag(black_anxiety_incid_c, 2) 0.409702
## dplyr::lag(black_anxiety_incid_c, 3) 0.873440
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_white_anxiety <- lmer(white_anxiety_incid_c~t+post_floyd+t_post_floyd+
                        state_of_emerg+stay_at_home+
                        uof_lag+stops_lag+shoot_lag+
                        tmax_f+snow_in+precip_in+
                        conc_dis+
                        dplyr::lag(white_anxiety_incid_c, 1)+ dplyr::lag(white_anxiety_incid_c, 2)+
                        dplyr::lag(white_anxiety_incid_c, 3)+
                        (post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_white_anxiety)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## white_anxiety_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + dplyr::lag(white_anxiety_incid_c,
## 1) + dplyr::lag(white_anxiety_incid_c, 2) + dplyr::lag(white_anxiety_incid_c,
## 3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 8830.1
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -3.1543 -0.2490 -0.0449  0.1658 15.5780
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept) 0.089904 0.29984
##           post_floyd1 0.001287 0.03587  -1.00
## Residual                0.264881 0.51467
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)   1.256e-01  6.959e-02 2.512e+01   1.804
## t              1.459e-03  1.272e-04 5.324e+03  11.467
## post_floyd1   -1.127e-02  7.168e-02 3.429e+03  -0.157
## t_post_floyd  -5.934e-03  2.244e-03 5.683e+03  -2.644
## state_of_emerg1 -8.819e-02  6.763e-02 5.682e+03  -1.304
## stay_at_home1  -5.354e-02  6.978e-02 5.681e+03  -0.767
## uof_lag        -1.104e-02  2.753e-03 5.118e+03  -4.009
## stops_lag      -1.275e-03  1.269e-03 2.950e+03  -1.004
## shoot_lag      -2.304e-01  5.381e-01 5.682e+03  -0.428
## tmax_f         4.806e-04  3.967e-04 5.682e+03   1.212
## snow_in        8.835e-03  1.969e-02 5.681e+03   0.449
## precip_in      6.327e-02  6.611e-02 5.682e+03   0.957
## conc_dis       -6.459e-02  4.835e-02 4.073e+01  -1.336
## dplyr::lag(white_anxiety_incid_c, 1) 6.195e-03  1.322e-02 5.703e+03   0.468
## dplyr::lag(white_anxiety_incid_c, 2) 6.840e-03  1.323e-02 5.702e+03   0.517
```

```
## dplyr::lag(white_anxiety_incid_c, 3) -5.753e-03  1.322e-02  5.703e+03  -0.435
##                                     Pr(>|t|)
## (Intercept)                        0.08320 .
## t                                  < 2e-16 ***
## post_floyd1                        0.87512
## t_post_floyd                      0.00822 **
## state_of_emerg1                   0.19229
## stay_at_home1                    0.44295
## uof_lag                           6.17e-05 ***
## stops_lag                         0.31526
## shoot_lag                         0.66854
## tmax_f                            0.22571
## snow_in                           0.65367
## precip_in                         0.33855
## conc_dis                          0.18905
## dplyr::lag(white_anxiety_incid_c, 1) 0.63950
## dplyr::lag(white_anxiety_incid_c, 2) 0.60508
## dplyr::lag(white_anxiety_incid_c, 3) 0.66354
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
re_latin_anxiety <- lmer(latin_anxiety_incid_c~t+post_floyd+t_post_floyd+
                        state_of_emerg+stay_at_home+
                        uof_lag+stops_lag+shoot_lag+
                        tmax_f+snow_in+precip_in+
                        conc_dis+
                        dplyr::lag(latin_anxiety_incid_c, 1)+ dplyr::lag(latin_anxiety_incid_c, 2)+
                        dplyr::lag(latin_anxiety_incid_c, 3)+
                        (post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_latin_anxiety)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## latin_anxiety_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + dplyr::lag(latin_anxiety_incid_c,
##   1) + dplyr::lag(latin_anxiety_incid_c, 2) + dplyr::lag(latin_anxiety_incid_c,
##   3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 18585.6
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -1.3051 -0.2102 -0.1076  0.0214 28.4455
##
## Random effects:
## Groups   Name                Variance Std.Dev. Corr
## zcta     (Intercept) 0.038590 0.19644
##          post_floyd1 0.004036 0.06353  -1.00
## Residual                1.665382 1.29050
```

```
## Number of obs: 5516, groups: zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)   -8.594e-02  8.255e-02  1.978e+02  -1.041
## t              1.606e-03  3.175e-04  5.497e+03   5.057
## post_floyd1    -2.009e-02  1.794e-01  4.147e+03  -0.112
## t_post_floyd   -7.929e-03  5.629e-03  5.483e+03  -1.409
## state_of_emerg1 -6.623e-02  1.696e-01  5.484e+03  -0.390
## stay_at_home1   4.231e-02  1.750e-01  5.481e+03   0.242
## uof_lag         2.004e-02  1.009e-02  4.142e+03   1.987
## stops_lag       7.200e-03  3.636e-03  1.156e+02   1.980
## shoot_lag      -4.423e-01  1.353e+00  5.487e+03  -0.327
## tmax_f         2.375e-03  1.015e-03  5.486e+03   2.341
## snow_in        5.251e-02  4.986e-02  5.481e+03   1.053
## precip_in      -2.349e-01  1.684e-01  5.482e+03  -1.394
## conc_dis       -3.381e-02  4.356e-02  2.139e+01  -0.776
## dplyr::lag(latin_anxiety_incid_c, 1) 3.417e-03  1.354e-02  5.496e+03   0.252
## dplyr::lag(latin_anxiety_incid_c, 2) -5.083e-03  1.354e-02  5.491e+03  -0.375
## dplyr::lag(latin_anxiety_incid_c, 3) -6.499e-03  1.354e-02  5.495e+03  -0.480
##
##              Pr(>|t|)
## (Intercept)      0.2992
## t                4.4e-07 ***
## post_floyd1      0.9108
## t_post_floyd     0.1590
## state_of_emerg1  0.6962
## stay_at_home1    0.8090
## uof_lag          0.0470 *
## stops_lag        0.0500 .
## shoot_lag        0.7437
## tmax_f           0.0193 *
## snow_in          0.2923
## precip_in        0.1633
## conc_dis         0.4461
## dplyr::lag(latin_anxiety_incid_c, 1) 0.8008
## dplyr::lag(latin_anxiety_incid_c, 2) 0.7074
## dplyr::lag(latin_anxiety_incid_c, 3) 0.6312
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
#extract random coefficients
re_pf_white_anxiety <- as.data.frame(coef(re_white_anxiety)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_white = post_floyd1)

re_pf_blk_anxiety <- as.data.frame(coef(re_blk_anxiety)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_blk = post_floyd1)

re_pf_latin_anxiety <- as.data.frame(coef(re_latin_anxiety)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_latin = post_floyd1)
```

```
#aggregate to zip-level over years
```

```

zip_level_anxiety <- panel %>%
  group_by(zcta) %>%
    summarize(mh_all_tot = sum(mh_all_tot, na.rm = T),
              total_pop = sum(total_pop, na.rm = T),
              conc_dis = mean(conc_dis, na.rm = T)) %>%
  mutate(mh_incid_c = (mh_all_tot/total_pop)*1000) %>%
  ungroup() %>%
  left_join(zcta, by = "zcta")

zip_level_anxiety <- zip_level_anxiety %>%
  left_join(re_pf_white_anxiety, by = c("zcta" = "zipcode")) %>%
  left_join(re_pf_blk_anxiety, by = c("zcta" = "zipcode")) %>%
  left_join(re_pf_latin_anxiety, by = c("zcta" = "zipcode"))

re_coef_map_white_anxiety <- ggplot() +
  geom_sf(data = zip_level_anxiety, aes(geometry = geometry, fill = post_floyd1_white), color = "lightgrey") +
  geom_sf(data = mpl, aes(geometry = geometry), color = "black", alpha = 0) +
  geom_sf(data = gfs, aes(geometry = geometry), color = "black") +
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold") +
  scale_fill_distiller(palette = "Spectral",
                      limits = c(min(zip_level_anxiety$post_floyd1_latin),
                                max(zip_level_anxiety$post_floyd1_blk))) +
  labs(title = "Figure A8: RE Coefficients-White Residents",
       subtitle = "Rate per 1,000",
       fill = "Post-Killing Change") +
  theme(axis.text.x = element_blank(),
        axis.text.y = element_blank(),
        axis.line = element_blank(),
        axis.ticks = element_blank(),
        panel.border = element_blank(),
        panel.grid = element_blank(),
        axis.title = element_blank(),
        panel.background = element_blank(),
        panel.grid.major = element_line(colour="transparent"),
        plot.subtitle = element_text(face="italic"),
        strip.background = element_rect(fill = "white",
                                         colour = "black")) +
  ggspatial::annotation_scale() +
  ggspatial::annotation_north_arrow(which_north = "true",
                                   location = "tr")

re_coef_map_blk_anxiety <- ggplot() +
  geom_sf(data = zip_level_anxiety, aes(geometry = geometry, fill = post_floyd1_blk), color = "lightgrey") +
  geom_sf(data = mpl, aes(geometry = geometry), color = "black", alpha = 0) +
  geom_sf(data = gfs, aes(geometry = geometry), color = "black") +
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold") +
  scale_fill_distiller(palette = "Spectral",
                      limits = c(min(zip_level_anxiety$post_floyd1_latin),
                                max(zip_level_anxiety$post_floyd1_blk))) +
  labs(title = "Figure A9: RE Coefficients-Black Residents",
       subtitle = "Rate per 1,000",
       fill = "Post-Killing Change") +
  theme(axis.text.x = element_blank(),
        axis.text.y = element_blank(),

```

```

axis.line = element_blank(),
axis.ticks = element_blank(),
panel.border = element_blank(),
panel.grid = element_blank(),
axis.title = element_blank(),
panel.background = element_blank(),
panel.grid.major = element_line(colour="transparent"),
plot.subtitle = element_text(face="italic"),
strip.background = element_rect(fill = "white",
                                colour = "black"))+
ggspatial::annotation_scale()+
ggspatial::annotation_north_arrow(which_north = "true",
                                location = "tr")

re_coef_map_latin_anxiety <- ggplot() +
  geom_sf(data = zip_level_anxiety, aes(geometry = geometry, fill = post_floyd1_latin), color = "lightgrey") +
  geom_sf(data = mpl, aes(geometry = geometry), color = "black", alpha = 0)+
  geom_sf(data = gfs, aes(geometry = geometry), color = "black")+
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold")+
  scale_fill_distiller(palette = "Spectral",
                      limits = c(min(zip_level_anxiety$post_floyd1_latin),
                                max(zip_level_anxiety$post_floyd1_blk)))+
  labs(title = "Figure A10: RE Coefficients-Latine Residents",
        subtitle = "Rate per 1,000",
        fill = "Post-Killing Change")+
  theme(axis.text.x = element_blank(),
        axis.text.y = element_blank(),
        axis.line = element_blank(),
        axis.ticks = element_blank(),
        panel.border = element_blank(),
        panel.grid = element_blank(),
        axis.title = element_blank(),
        panel.background = element_blank(),
        panel.grid.major = element_line(colour="transparent"),
        plot.subtitle = element_text(face="italic"),
        strip.background = element_rect(fill = "white",
                                        colour = "black"))+
  ggspatial::annotation_scale()+
  ggspatial::annotation_north_arrow(which_north = "true",
                                    location = "tr")

#RE random coefficient model - interaction
re_int_anxiety <- lmer(depress_incid_c~t+post_floyd+t_post_floyd+
                      state_of_emerg+stay_at_home+
                      uof_lag+stops_lag+shoot_lag+
                      tmax_f+snow_in+precip_in+conc_dis+
                      post_floyd:conc_dis+
                      dplyr::lag(depress_incid_c, 1)+ dplyr::lag(depress_incid_c, 2)+
                      dplyr::lag(depress_incid_c, 3)+
                      (1+post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling

```



```
summary(re_int_anxiety)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: depress_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(depress_incid_c,
##   1) + dplyr::lag(depress_incid_c, 2) + dplyr::lag(depress_incid_c,
##   3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 14183.6
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -6.1963 -0.1897 -0.0260  0.1564 13.3722
##
## Random effects:
##   Groups      Name      Variance Std.Dev. Corr
##   zcta      (Intercept) 1.1265   1.0614
##             post_floyd1 0.2104   0.4587  -1.00
## Residual                0.6726   0.8201
## Number of obs: 5720, groups: zcta, 22
##
## Fixed effects:
##              Estimate Std. Error      df t value
## (Intercept)    9.029e-01  2.315e-01  2.101e+01   3.900
## t              -9.307e-05  1.995e-04  5.293e+03  -0.467
## post_floyd1    4.998e-02  1.499e-01  8.591e+01   0.333
## t_post_floyd  -1.451e-02  3.585e-03  5.683e+03  -4.047
## state_of_emerg1 -6.733e-02  1.077e-01  5.682e+03  -0.625
## stay_at_home1  -1.575e-01  1.113e-01  5.681e+03  -1.416
## uof_lag         3.112e-03  4.435e-03  5.676e+03   0.702
## stops_lag       3.847e-03  2.117e-03  5.503e+03   1.817
## shoot_lag      -4.723e-02  8.575e-01  5.681e+03  -0.055
## tmax_f          8.347e-05  6.319e-04  5.681e+03   0.132
## snow_in         3.081e-02  3.137e-02  5.681e+03   0.982
## precip_in      -7.265e-02  1.053e-01  5.681e+03  -0.690
## conc_dis        3.346e-01  1.253e-01  2.483e+02   2.671
## dplyr::lag(depress_incid_c, 1) -3.595e-03  1.323e-02  5.703e+03  -0.272
## dplyr::lag(depress_incid_c, 2)  2.015e-03  1.324e-02  5.703e+03   0.152
## dplyr::lag(depress_incid_c, 3)  1.017e-04  1.323e-02  5.703e+03   0.008
## post_floyd1:conc_dis -1.620e-01  6.631e-02  1.190e+02  -2.443
##
##              Pr(>|t|)
## (Intercept)    0.000825 ***
## t              0.640813
## post_floyd1    0.739647
## t_post_floyd   5.26e-05 ***
## state_of_emerg1 0.531943
## stay_at_home1  0.156946
## uof_lag        0.482989
## stops_lag      0.069256 .
## shoot_lag      0.956076
## tmax_f         0.894923
## snow_in        0.326156
## precip_in      0.490310
## conc_dis       0.008056 **
## dplyr::lag(depress_incid_c, 1) 0.785869
## dplyr::lag(depress_incid_c, 2) 0.879023
## dplyr::lag(depress_incid_c, 3) 0.993872
## post_floyd1:conc_dis 0.016035 *
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_int_blk_anxiety <- lmer(black_anxiety_incid_c~t+post_floyd+t_post_floyd+
                          state_of_emerg+stay_at_home+
                          uof_lag+stops_lag+shoot_lag+
                          tmax_f+snow_in+precip_in+conc_dis+
                          post_floyd:conc_dis+
                          dplyr::lag(black_anxiety_incid_c, 1)+ dplyr::lag(black_anxiety_incid_c, 2)+
                          dplyr::lag(black_anxiety_incid_c, 3)+
                          (1+post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling

summary(re_int_blk_anxiety)

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## black_anxiety_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(black_anxiety_incid_c,
##   1) + dplyr::lag(black_anxiety_incid_c, 2) + dplyr::lag(black_anxiety_incid_c,
##   3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 22845.4
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -1.939 -0.173 -0.076  0.053  56.316
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)  0.000      0.00
##           post_floyd1  0.000      0.00    NaN
## Residual                3.134      1.77
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)   1.277e-01  9.358e-02 5.703e+03  1.365
## t              1.497e-03  4.160e-04 5.703e+03  3.599
## post_floyd1    2.196e-02  2.451e-01 5.703e+03  0.090
## t_post_floyd   -1.217e-02  7.709e-03 5.703e+03 -1.578
## state_of_emerg -4.623e-02  2.324e-01 5.703e+03 -0.199
## stay_at_home1  -1.311e-01  2.400e-01 5.703e+03 -0.546
## uof_lag         9.192e-03  7.969e-03 5.703e+03  1.154
## stops_lag       2.859e-02  2.848e-03 5.703e+03 10.040
## shoot_lag       -1.853e-02  1.847e+00 5.703e+03 -0.010
## tmax_f          -1.303e-04  1.363e-03 5.703e+03 -0.096
## snow_in         5.134e-02  6.772e-02 5.703e+03  0.758
## precip_in       -4.893e-01  2.275e-01 5.703e+03 -2.151
## conc_dis        -6.739e-02  2.669e-02 5.703e+03 -2.525
## dplyr::lag(black_anxiety_incid_c, 1) -5.643e-03  1.306e-02 5.703e+03 -0.432
```

```
## dplyr::lag(black_anxiety_incid_c, 2) -1.065e-02 1.308e-02 5.703e+03 -0.814
## dplyr::lag(black_anxiety_incid_c, 3) -2.142e-03 1.305e-02 5.703e+03 -0.164
## post_floyd1:conc_dis 4.983e-02 7.193e-02 5.703e+03 0.693
## Pr(>|t|)
## (Intercept) 0.172317
## t 0.000322 ***
## post_floyd1 0.928601
## t_post_floyd 0.114570
## state_of_emerg1 0.842337
## stay_at_home1 0.585075
## uof_lag 0.248740
## stops_lag < 2e-16 ***
## shoot_lag 0.991997
## tmax_f 0.923877
## snow_in 0.448399
## precip_in 0.031526 *
## conc_dis 0.011593 *
## dplyr::lag(black_anxiety_incid_c, 1) 0.665601
## dplyr::lag(black_anxiety_incid_c, 2) 0.415430
## dplyr::lag(black_anxiety_incid_c, 3) 0.869665
## post_floyd1:conc_dis 0.488439
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
re_int_white_anxiety <- lmer(white_anxiety_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+conc_dis+
  post_floyd:conc_dis+
  dplyr::lag(white_anxiety_incid_c, 1)+ dplyr::lag(white_anxiety_incid_c, 2)+
  dplyr::lag(white_anxiety_incid_c, 3)+
  (1+post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_int_white_anxiety)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## white_anxiety_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
## stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
## snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(white_anxiety_incid_c,
## 1) + dplyr::lag(white_anxiety_incid_c, 2) + dplyr::lag(white_anxiety_incid_c,
## 3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 8828.6
##
## Scaled residuals:
## Min 1Q Median 3Q Max
## -3.2336 -0.2516 -0.0466 0.1674 15.7542
##
## Random effects:
## Groups Name Variance Std.Dev. Corr
```

```
## zcta      (Intercept) 0.10892  0.33003
##          post_floyd1 0.00321  0.05666 -1.00
## Residual          0.26442  0.51422
## Number of obs: 5720, groups: zcta, 22
##
## Fixed effects:
##
##          Estimate Std. Error      df t value
## (Intercept)      1.311e-01  7.556e-02  1.991e+01   1.735
## t                1.432e-03  1.277e-04  5.063e+03  11.214
## post_floyd1      -9.061e-03  7.224e-02  1.937e+03  -0.125
## t_post_floyd     -5.873e-03  2.243e-03  5.679e+03  -2.619
## state_of_emerg1  -9.016e-02  6.757e-02  5.678e+03  -1.334
## stay_at_home1    -5.359e-02  6.972e-02  5.676e+03  -0.769
## uof_lag          -1.139e-02  2.758e-03  5.232e+03  -4.131
## stops_lag        -1.991e-03  1.285e-03  2.867e+03  -1.549
## shoot_lag        -2.178e-01  5.377e-01  5.677e+03  -0.405
## tmax_f           4.904e-04  3.963e-04  5.677e+03   1.237
## snow_in          8.782e-03  1.967e-02  5.676e+03   0.446
## precip_in        6.433e-02  6.605e-02  5.677e+03   0.974
## conc_dis         -1.416e-01  5.675e-02  4.520e+01  -2.494
## dplyr::lag(white_anxiety_incid_c, 1)  5.904e-03  1.322e-02  5.699e+03   0.447
## dplyr::lag(white_anxiety_incid_c, 2)  7.125e-03  1.322e-02  5.697e+03   0.539
## dplyr::lag(white_anxiety_incid_c, 3) -5.843e-03  1.321e-02  5.698e+03  -0.442
## post_floyd1:conc_dis  6.770e-02  2.408e-02  6.537e+01   2.811
##
##          Pr(>|t|)
## (Intercept)      0.09825 .
## t                < 2e-16 ***
## post_floyd1      0.90019
## t_post_floyd     0.00885 **
## state_of_emerg1  0.18219
## stay_at_home1    0.44210
## uof_lag          3.67e-05 ***
## stops_lag        0.12145
## shoot_lag        0.68546
## tmax_f           0.21597
## snow_in          0.65533
## precip_in        0.33009
## conc_dis         0.01634 *
## dplyr::lag(white_anxiety_incid_c, 1)  0.65509
## dplyr::lag(white_anxiety_incid_c, 2)  0.58989
## dplyr::lag(white_anxiety_incid_c, 3)  0.65839
## post_floyd1:conc_dis  0.00650 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_int_latin_anxiety <- lmer(latin_anxiety_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+conc_dis+
  post_floyd:conc_dis+
  dplyr::lag(latin_anxiety_incid_c, 1)+ dplyr::lag(latin_anxiety_incid_c, 2)+
  dplyr::lag(latin_anxiety_incid_c, 3)+
  (1+post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
```

```
## rescaling
summary(re_int_latin_anxiety)

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## latin_anxiety_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(latin_anxiety_incid_c,
##   1) + dplyr::lag(latin_anxiety_incid_c, 2) + dplyr::lag(latin_anxiety_incid_c,
##   3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 18588.1
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -1.2986 -0.2102 -0.1063  0.0218 28.4469
##
## Random effects:
##   Groups      Name      Variance Std.Dev. Corr
##   zcta      (Intercept) 0.039593 0.19898
##             post_floyd1 0.004797 0.06926  -1.00
## Residual              1.665131 1.29040
## Number of obs: 5516, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)   -8.377e-02  8.285e-02  1.844e+02  -1.011
## t              1.599e-03  3.176e-04  5.486e+03   5.036
## post_floyd1   -1.732e-02  1.795e-01  3.943e+03  -0.097
## t_post_floyd  -7.910e-03  5.629e-03  5.482e+03  -1.405
## state_of_emerg1 -6.742e-02  1.696e-01  5.483e+03  -0.398
## stay_at_home1  4.253e-02  1.750e-01  5.480e+03   0.243
## uof_lag        2.027e-02  1.009e-02  4.194e+03   2.009
## stops_lag      6.728e-03  3.672e-03  1.096e+02   1.833
## shoot_lag     -4.310e-01  1.353e+00  5.486e+03  -0.319
## tmax_f         2.382e-03  1.014e-03  5.485e+03   2.348
## snow_in        5.253e-02  4.985e-02  5.480e+03   1.054
## precip_in     -2.347e-01  1.684e-01  5.480e+03  -1.393
## conc_dis      -5.801e-02  4.813e-02  2.158e+01  -1.205
## dplyr::lag(latin_anxiety_incid_c, 1)  3.045e-03  1.355e-02  5.496e+03   0.225
## dplyr::lag(latin_anxiety_incid_c, 2) -5.037e-03  1.354e-02  5.490e+03  -0.372
## dplyr::lag(latin_anxiety_incid_c, 3) -6.659e-03  1.354e-02  5.494e+03  -0.492
## post_floyd1:conc_dis  6.724e-02  5.526e-02  1.008e+02   1.217
##
##              Pr(>|t|)
## (Intercept)    0.3133
## t              4.92e-07 ***
## post_floyd1    0.9231
## t_post_floyd   0.1600
## state_of_emerg1 0.6910
## stay_at_home1  0.8080
## uof_lag        0.0446 *
## stops_lag      0.0696 .
## shoot_lag      0.7500
## tmax_f         0.0189 *
## snow_in        0.2920
## precip_in      0.1636
## conc_dis       0.2412
## dplyr::lag(latin_anxiety_incid_c, 1)  0.8222
## dplyr::lag(latin_anxiety_incid_c, 2)  0.7100
```

```
## dplyr::lag(latin_anxiety_incid_c, 3)    0.6229
## post_floyd1:conc_dis                    0.2265
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
#specifying varcov objects from model estimates
var_re_white_anxiety <- VarCorr(re_white_anxiety)
var_re_int_white_anxiety <- VarCorr(re_int_white_anxiety)
var_re_black_anxiety <- VarCorr(re_blk_anxiety)
var_re_int_black_anxiety <- VarCorr(re_int_blk_anxiety)
var_re_latin_anxiety <- VarCorr(re_latin_anxiety)
var_re_int_latin_anxiety <- VarCorr(re_int_latin_anxiety)
class(re_white_anxiety) <- "lmerMod"
class(re_blk_anxiety) <- "lmerMod"
class(re_latin_anxiety) <- "lmerMod"
class(re_int_blk_anxiety) <- "lmerMod"
class(re_int_white_anxiety) <- "lmerMod"
class(re_int_blk_anxiety) <- "lmerMod"
class(re_int_latin_anxiety) <- "lmerMod"
```

```
(re_coef_map_white_anxiety+re_coef_map_blk_anxiety)/(re_coef_map_latin_anxiety+cd_map)
```

Figure A8: RE Coefficients–White  
Rate per 1,000

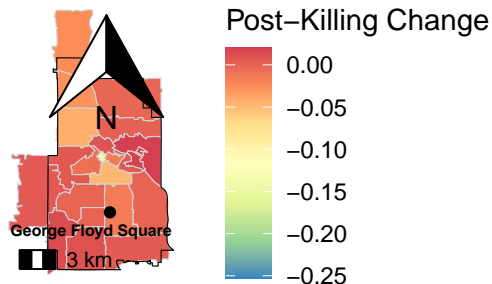


Figure A9: RE Coefficients–Black Resic  
Rate per 1,000

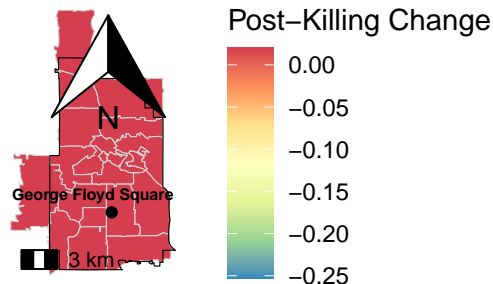


Figure A10: RE Coefficients–Latin  
Rate per 1,000

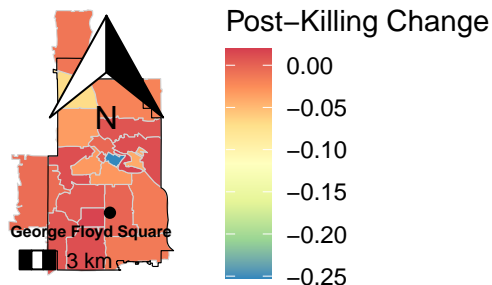
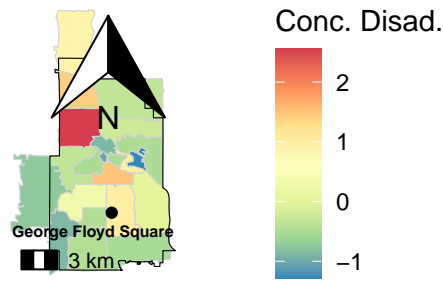


Figure 6: Concentrated Disadvantage  
Standard Deviation Units



```
#RE random coefficient model
re_alcohol <- lmer(ethoh_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  conc_dis+
  dplyr::lag(ethoh_incid_c, 1)+ dplyr::lag(ethoh_incid_c, 2)+
  dplyr::lag(ethoh_incid_c, 3)+
```

```
(post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_alcohol)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: etoh_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + dplyr::lag(etoh_incid_c,
## 1) + dplyr::lag(etoh_incid_c, 2) + dplyr::lag(etoh_incid_c,
## 3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 17397
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -7.5026 -0.1497 -0.0116  0.1210 16.8496
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)  3.1289     1.7689
##           post_floyd1  0.3196     0.5654   -1.00
## Residual                    1.1797     1.0861
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value Pr(>|t|)
## (Intercept)    1.080e+00  3.823e-01 2.187e+01   2.824  0.00993
## t              -7.116e-04  2.583e-04 5.611e+03  -2.755  0.00590
## post_floyd1     1.319e-01  1.928e-01 1.066e+02   0.684  0.49538
## t_post_floyd   -2.036e-02  4.751e-03 5.684e+03  -4.286 1.85e-05
## state_of_emerg1 -5.642e-02  1.426e-01 5.683e+03  -0.396  0.69243
## stay_at_home1   -7.824e-03  1.473e-01 5.683e+03  -0.053  0.95763
## uof_lag         -1.373e-02  5.872e-03 5.701e+03  -2.337  0.01946
## stops_lag       1.371e-02  2.760e-03 5.556e+03   4.966 7.02e-07
## shoot_lag       -9.195e-01  1.136e+00 5.683e+03  -0.810  0.41813
## tmax_f          2.224e-03  8.386e-04 5.683e+03   2.652  0.00803
## snow_in         5.154e-02  4.157e-02 5.683e+03   1.240  0.21515
## precip_in       8.167e-02  1.395e-01 5.683e+03   0.586  0.55814
## conc_dis        5.367e-02  9.745e-02 2.285e+02   0.551  0.58236
## dplyr::lag(etoh_incid_c, 1) -6.634e-03  1.320e-02 5.704e+03  -0.502  0.61538
## dplyr::lag(etoh_incid_c, 2) -3.111e-03  1.321e-02 5.703e+03  -0.236  0.81376
## dplyr::lag(etoh_incid_c, 3)  4.810e-03  1.320e-02 5.704e+03   0.364  0.71564
##
## (Intercept)      **
## t                 **
## post_floyd1
## t_post_floyd     ***
## state_of_emerg1
## stay_at_home1
## uof_lag           *
## stops_lag         ***
## shoot_lag
## tmax_f            **
## snow_in
```

```
## precip_in
## conc_dis
## dplyr::lag(etoh_incid_c, 1)
## dplyr::lag(etoh_incid_c, 2)
## dplyr::lag(etoh_incid_c, 3)
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_blk_alcohol <- lmer(black_etoh_incid_c~t+post_floyd+t_post_floyd+
                      state_of_emerg+stay_at_home+
                      uof_lag+stops_lag+shoot_lag+
                      tmax_f+snow_in+precip_in+
                      conc_dis+
                      dplyr::lag(black_etoh_incid_c, 1)+ dplyr::lag(black_etoh_incid_c, 2)+
                      dplyr::lag(black_etoh_incid_c, 3)+
                      (post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_blk_alcohol)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: black_etoh_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##      stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##      snow_in + precip_in + conc_dis + dplyr::lag(black_etoh_incid_c,
##      1) + dplyr::lag(black_etoh_incid_c, 2) + dplyr::lag(black_etoh_incid_c,
##      3) + (post_floyd | zcta)
##      Data: panel
##
## REML criterion at convergence: 26028.5
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.460 -0.115 -0.032  0.053  58.652
##
## Random effects:
##      Groups      Name                Variance Std.Dev. Corr
##      zcta      (Intercept) 0.07977   0.2824
##               post_floyd1 0.72872   0.8537   -0.03
##      Residual                5.41633   2.3273
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)   1.433e-01  1.371e-01  8.011e+01  1.045
## t              1.698e-03  5.481e-04  5.671e+03  3.098
## post_floyd1    2.453e+00  3.703e-01  2.199e+02  6.625
## t_post_floyd   -4.589e-02  1.021e-02  5.624e+03 -4.493
## state_of_emerg1 -1.711e+00  3.056e-01  5.619e+03 -5.599
## stay_at_home1   1.971e+00  3.158e-01  5.615e+03  6.241
## uof_lag         -3.361e-02  1.148e-02  3.946e+02 -2.927
## stops_lag       2.842e-02  4.833e-03  5.991e+01  5.880
## shoot_lag       -6.291e-01  2.460e+00  5.653e+03 -0.256
## tmax_f          -2.491e-03  1.793e-03  5.627e+03 -1.390
```



```
## snow_in -3.288e-02 8.902e-02 5.612e+03 -0.369
## precip_in 5.075e-01 2.989e-01 5.613e+03 1.698
## conc_dis -1.202e-01 7.142e-02 5.543e+00 -1.682
## dplyr::lag(black_etch_incid_c, 1) 2.067e-03 1.329e-02 5.569e+03 0.155
## dplyr::lag(black_etch_incid_c, 2) -1.236e-02 1.317e-02 5.614e+03 -0.938
## dplyr::lag(black_etch_incid_c, 3) 2.513e-03 1.314e-02 5.582e+03 0.191
## Pr(>|t|)
## (Intercept) 0.29912
## t 0.00196 **
## post_floyd1 2.63e-10 ***
## t_post_floyd 7.16e-06 ***
## state_of_emerg1 2.26e-08 ***
## stay_at_home1 4.67e-10 ***
## uof_lag 0.00363 **
## stops_lag 1.95e-07 ***
## shoot_lag 0.79813
## tmax_f 0.16468
## snow_in 0.71189
## precip_in 0.08956 .
## conc_dis 0.14754
## dplyr::lag(black_etch_incid_c, 1) 0.87644
## dplyr::lag(black_etch_incid_c, 2) 0.34815
## dplyr::lag(black_etch_incid_c, 3) 0.84840
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
```

```
re_white_alcohol <- lmer(white_etch_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  conc_dis+
  dplyr::lag(white_etch_incid_c, 1)+ dplyr::lag(white_etch_incid_c, 2)+
  dplyr::lag(white_etch_incid_c, 3)+
  (post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_white_alcohol)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: white_etch_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
## stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
## snow_in + precip_in + conc_dis + dplyr::lag(white_etch_incid_c,
## 1) + dplyr::lag(white_etch_incid_c, 2) + dplyr::lag(white_etch_incid_c,
## 3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 9739.9
##
## Scaled residuals:
## Min 1Q Median 3Q Max
## -3.8997 -0.1700 -0.0294 0.1159 27.5044
##
## Random effects:
## Groups Name Variance Std.Dev. Corr
## zcta (Intercept) 0.095081 0.30835
```

```

##           post_floyd1 0.003018 0.05494 1.00
## Residual           0.310686 0.55739
## Number of obs: 5720, groups: zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)      2.119e-02  7.213e-02  2.263e+01  0.294
## t                8.748e-04  1.349e-04  5.114e+03  6.487
## post_floyd1      -9.504e-02  7.810e-02  2.555e+03 -1.217
## t_post_floyd     -4.788e-03  2.429e-03  5.681e+03 -1.971
## state_of_emerg1   7.215e-02  7.319e-02  5.680e+03  0.986
## stay_at_home1     -7.155e-02  7.558e-02  5.679e+03 -0.947
## uof_lag          -1.426e-02  2.939e-03  4.143e+03 -4.852
## stops_lag         8.064e-03  1.322e-03  1.671e+03  6.099
## shoot_lag        -7.701e-02  5.828e-01  5.680e+03 -0.132
## tmax_f           1.243e-03  4.303e-04  5.680e+03  2.889
## snow_in           4.214e-02  2.134e-02  5.679e+03  1.974
## precip_in         6.040e-02  7.158e-02  5.680e+03  0.844
## conc_dis         -1.175e-01  5.324e-02  3.442e+01 -2.206
## dplyr::lag(white_eto
## h_incid_c, 1)      -8.231e-03  1.315e-02  5.701e+03 -0.626
## dplyr::lag(white_eto
## h_incid_c, 2)      9.756e-03  1.316e-02  5.701e+03  0.741
## dplyr::lag(white_eto
## h_incid_c, 3)      4.697e-03  1.315e-02  5.701e+03  0.357
##
##              Pr(>|t|)
## (Intercept)           0.77156
## t                    9.57e-11 ***
## post_floyd1           0.22375
## t_post_floyd          0.04873 *
## state_of_emerg1       0.32426
## stay_at_home1         0.34387
## uof_lag               1.26e-06 ***
## stops_lag             1.33e-09 ***
## shoot_lag             0.89488
## tmax_f                0.00387 **
## snow_in               0.04838 *
## precip_in             0.39884
## conc_dis              0.03413 *
## dplyr::lag(white_eto
## h_incid_c, 1)        0.53149
## dplyr::lag(white_eto
## h_incid_c, 2)        0.45866
## dplyr::lag(white_eto
## h_incid_c, 3)        0.72105
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
re_latin_alcohol <- lmer(latin_eto
h_incid_c~t+post_floyd+t_post_floyd+
state_of_emerg+stay_at_home+
uof_lag+stops_lag+shoot_lag+
tmax_f+snow_in+precip_in+
conc_dis+
dplyr::lag(latin_eto
h_incid_c, 1)+ dplyr::lag(latin_eto
h_incid_c, 2)+
dplyr::lag(latin_eto
h_incid_c, 3)+
(post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling

```

```
summary(re_latin_alcohol)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: latin_etoh_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + dplyr::lag(latin_etoh_incid_c,
##   1) + dplyr::lag(latin_etoh_incid_c, 2) + dplyr::lag(latin_etoh_incid_c,
##   3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 27025.8
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -2.529 -0.097 -0.037  0.021 50.496
##
## Random effects:
##   Groups      Name      Variance Std.Dev. Corr
##   zcta      (Intercept) 0.66037  0.8126
##             post_floyd1 0.04862  0.2205  0.01
## Residual              7.68022  2.7713
## Number of obs: 5516, groups: zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)    1.930e-01  2.314e-01  3.969e+01  0.834
## t              2.067e-03  6.810e-04  5.415e+03  3.035
## post_floyd1    1.404e-01  3.870e-01  1.226e+03  0.363
## t_post_floyd   -4.568e-03  1.209e-02  5.456e+03 -0.378
## state_of_emerg1 -3.233e-01  3.643e-01  5.459e+03 -0.888
## stay_at_home1   2.768e-01  3.759e-01  5.453e+03  0.736
## uof_lag         1.120e-01  2.205e-02  5.099e+03  5.081
## stops_lag      -3.889e-02  8.761e-03  1.446e+02 -4.439
## shoot_lag      -1.793e+00  2.906e+00  5.459e+03 -0.617
## tmax_f          2.175e-04  2.173e-03  5.459e+03  0.100
## snow_in        -1.286e-01  1.070e-01  5.453e+03 -1.202
## precip_in       6.672e-02  3.616e-01  5.454e+03  0.185
## conc_dis       -4.328e-01  1.726e-01  1.912e+01 -2.508
## dplyr::lag(latin_etoh_incid_c, 1) 8.617e-04  1.344e-02  5.477e+03  0.064
## dplyr::lag(latin_etoh_incid_c, 2) -4.167e-03  1.344e-02  5.479e+03 -0.310
## dplyr::lag(latin_etoh_incid_c, 3) 5.012e-03  1.343e-02  5.478e+03  0.373
##
##              Pr(>|t|)
## (Intercept)    0.40919
## t              0.00242 **
## post_floyd1    0.71686
## t_post_floyd   0.70543
## state_of_emerg1 0.37482
## stay_at_home1  0.46157
## uof_lag        3.89e-07 ***
## stops_lag      1.78e-05 ***
## shoot_lag      0.53717
## tmax_f         0.92026
## snow_in        0.22943
## precip_in      0.85362
## conc_dis       0.02133 *
## dplyr::lag(latin_etoh_incid_c, 1) 0.94888
## dplyr::lag(latin_etoh_incid_c, 2) 0.75658
## dplyr::lag(latin_etoh_incid_c, 3) 0.70910
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```

## fit warnings:
## Some predictor variables are on very different scales: consider rescaling

#extract random coefficients
re_pf_white_alcohol <- as.data.frame(coef(re_white_alcohol)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_white = post_floyd1)

re_pf_blk_alcohol <- as.data.frame(coef(re_blk_alcohol)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_blk = post_floyd1)

re_pf_latin_alcohol <- as.data.frame(coef(re_latin_alcohol)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_latin = post_floyd1)

#aggregate to zip-level over years
zip_level_alcohol <- panel %>%
  group_by(zcta) %>%
  summarize(mh_all_tot = sum(mh_all_tot, na.rm = T),
            total_pop = sum(total_pop, na.rm = T),
            conc_dis = mean(conc_dis, na.rm = T)) %>%
  mutate(mh_incid_c = (mh_all_tot/total_pop)*1000) %>%
  ungroup() %>%
  left_join(zcta, by = "zcta")

zip_level_alcohol <- zip_level_alcohol %>%
  left_join(re_pf_white_alcohol, by = c("zcta" = "zipcode")) %>%
  left_join(re_pf_blk_alcohol, by = c("zcta" = "zipcode")) %>%
  left_join(re_pf_latin_alcohol, by = c("zcta" = "zipcode"))

re_coef_map_white_alcohol <- ggplot() +
  geom_sf(data = zip_level_alcohol, aes(geometry = geometry, fill = post_floyd1_white), color = "lightgrey") +
  geom_sf(data = mpl, aes(geometry = geometry), color = "black", alpha = 0) +
  geom_sf(data = gfs, aes(geometry = geometry), color = "black") +
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold") +
  scale_fill_distiller(palette = "Spectral",
                       limits = c(min(zip_level_alcohol$post_floyd1_white),
                                   max(zip_level_alcohol$post_floyd1_blk))) +
  labs(title = "Figure A13: RE Coefficients-White Residents",
        subtitle = "Rate per 1,000",
        fill = "Post-Killing Change") +
  theme(axis.text.x = element_blank(),
        axis.text.y = element_blank(),
        axis.line = element_blank(),
        axis.ticks = element_blank(),
        panel.border = element_blank(),
        panel.grid = element_blank(),
        axis.title = element_blank(),
        panel.background = element_blank(),
        panel.grid.major = element_line(colour="transparent"),
        plot.subtitle = element_text(face="italic"),
        strip.background = element_rect(fill = "white",

```

```

        colour = "black"))+
ggspatial::annotation_scale()+
ggspatial::annotation_north_arrow(which_north = "true",
                                  location = "tr")

re_coef_map_blk_alcohol <- ggplot() +
  geom_sf(data = zip_level_alcohol, aes(geometry = geometry, fill = post_floyd1_blk), color = "lightgrey") +
  geom_sf(data = mpls, aes(geometry = geometry), color = "black", alpha = 0)+
  geom_sf(data = gfs, aes(geometry = geometry), color = "black")+
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold")+
  scale_fill_distiller(palette = "Spectral",
                      limits = c(min(zip_level_alcohol$post_floyd1_white),
                                max(zip_level_alcohol$post_floyd1_blk)))+
  labs(title = "Figure A14: RE Coefficients-Black Residents",
       subtitle = "Rate per 1,000",
       fill = "Post-Killing Change")+
  theme(axis.text.x = element_blank(),
        axis.text.y = element_blank(),
        axis.line = element_blank(),
        axis.ticks = element_blank(),
        panel.border = element_blank(),
        panel.grid = element_blank(),
        axis.title = element_blank(),
        panel.background = element_blank(),
        panel.grid.major = element_line(colour="transparent"),
        plot.subtitle = element_text(face="italic"),
        strip.background = element_rect(fill = "white",
                                         colour = "black"))+
  ggspatial::annotation_scale()+
  ggspatial::annotation_north_arrow(which_north = "true",
                                    location = "tr")

re_coef_map_latino_alcohol <- ggplot() +
  geom_sf(data = zip_level_alcohol, aes(geometry = geometry, fill = post_floyd1_latino), color = "lightgrey") +
  geom_sf(data = mpls, aes(geometry = geometry), color = "black", alpha = 0)+
  geom_sf(data = gfs, aes(geometry = geometry), color = "black")+
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold")+
  scale_fill_distiller(palette = "Spectral",
                      limits = c(min(zip_level_alcohol$post_floyd1_white),
                                max(zip_level_alcohol$post_floyd1_blk)))+
  labs(title = "Figure A15: RE Coefficients-Latino Residents",
       subtitle = "Rate per 1,000",
       fill = "Post-Killing Change")+
  theme(axis.text.x = element_blank(),
        axis.text.y = element_blank(),
        axis.line = element_blank(),
        axis.ticks = element_blank(),
        panel.border = element_blank(),
        panel.grid = element_blank(),
        axis.title = element_blank(),
        panel.background = element_blank(),
        panel.grid.major = element_line(colour="transparent"),
        plot.subtitle = element_text(face="italic"),
        strip.background = element_rect(fill = "white",
                                         colour = "black"))+
  ggspatial::annotation_scale()+
  ggspatial::annotation_north_arrow(which_north = "true",
                                    location = "tr")

```

```
location = "tr")
```

```
#RE random coefficient model - interaction
```

```
re_int_alcohol <- lmer(ethoh_incid_c~t+post_floyd+t_post_floyd+  
  state_of_emerg+stay_at_home+  
  uof_lag+stops_lag+shoot_lag+  
  tmax_f+snow_in+precip_in+conc_dis+  
  post_floyd:conc_dis+  
  dplyr::lag(ethoh_incid_c, 1)+ dplyr::lag(ethoh_incid_c, 2)+  
  dplyr::lag(ethoh_incid_c, 3)+  
  (1+post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider  
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider  
## rescaling
```

```
summary(re_int_alcohol)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
## lmerModLmerTest]  
## Formula: ethoh_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +  
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +  
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(ethoh_incid_c,  
##   1) + dplyr::lag(ethoh_incid_c, 2) + dplyr::lag(ethoh_incid_c,  
##   3) + (1 + post_floyd | zcta)  
##   Data: panel  
##  
## REML criterion at convergence: 17399.2  
##  
## Scaled residuals:  
##      Min       1Q   Median       3Q      Max   
## -7.5038 -0.1499 -0.0110  0.1213 16.8638   
##  
## Random effects:  
##   Groups   Name                Variance Std.Dev. Corr   
##   zcta     (Intercept)  3.0965     1.7597   
##           post_floyd1  0.3185     0.5644  -1.00   
##   Residual                    1.1797     1.0862   
## Number of obs: 5720, groups:  zcta, 22  
##  
## Fixed effects:  
##                                     Estimate Std. Error      df t value Pr(>|t|)   
## (Intercept)                   1.089e+00  3.805e-01 2.190e+01  2.861  0.00911   
## t                             -7.751e-04  2.650e-04 5.522e+03 -2.924  0.00346   
## post_floyd1                   1.356e-01  1.927e-01 1.065e+02  0.704  0.48303   
## t_post_floyd                  -2.027e-02  4.752e-03 5.684e+03 -4.266 2.03e-05   
## state_of_emerg1               -5.880e-02  1.426e-01 5.683e+03 -0.412  0.68022   
## stay_at_home1                 -7.258e-03  1.473e-01 5.682e+03 -0.049  0.96069   
## uof_lag                       -1.331e-02  5.884e-03 5.702e+03 -2.263  0.02368   
## stops_lag                     1.324e-02  2.793e-03 5.464e+03  4.740 2.19e-06   
## shoot_lag                     -9.056e-01  1.136e+00 5.682e+03 -0.797  0.42521   
## tmax_f                       2.232e-03  8.386e-04 5.683e+03  2.661  0.00780   
## snow_in                      5.144e-02  4.157e-02 5.682e+03  1.237  0.21598   
## precip_in                    8.343e-02  1.395e-01 5.683e+03  0.598  0.54973   
## conc_dis                     -9.826e-02  1.718e-01 5.391e+02 -0.572  0.56760   
## dplyr::lag(ethoh_incid_c, 1) -6.597e-03  1.320e-02 5.702e+03 -0.500  0.61733   
## dplyr::lag(ethoh_incid_c, 2) -2.720e-03  1.321e-02 5.702e+03 -0.206  0.83687   
## dplyr::lag(ethoh_incid_c, 3)  4.380e-03  1.321e-02 5.702e+03  0.332  0.74019   
## post_floyd1:conc_dis          7.979e-02  7.490e-02 1.880e+02  1.065  0.28809
```

```
##
## (Intercept)          **
## t                    **
## post_floyd1
## t_post_floyd        ***
## state_of_emerg1
## stay_at_home1
## uof_lag              *
## stops_lag            ***
## shoot_lag
## tmax_f               **
## snow_in
## precip_in
## conc_dis
## dplyr::lag(ethoh_incid_c, 1)
## dplyr::lag(ethoh_incid_c, 2)
## dplyr::lag(ethoh_incid_c, 3)
## post_floyd1:conc_dis
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_int_blk_alcohol <- lmer(black_ethoh_incid_c~t+post_floyd+t_post_floyd+
                           state_of_emerg+stay_at_home+
                           uof_lag+stops_lag+shoot_lag+
                           tmax_f+snow_in+precip_in+conc_dis+
                           post_floyd:conc_dis+
                           dplyr::lag(black_ethoh_incid_c, 1)+ dplyr::lag(black_ethoh_incid_c, 2)+
                           dplyr::lag(black_ethoh_incid_c, 3)+
                           (1+post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling

summary(re_int_blk_alcohol)

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: black_ethoh_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##      stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##      snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(black_ethoh_incid_c,
##      1) + dplyr::lag(black_ethoh_incid_c, 2) + dplyr::lag(black_ethoh_incid_c,
##      3) + (1 + post_floyd | zcta)
##      Data: panel
##
## REML criterion at convergence: 26027.8
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.485 -0.114 -0.034  0.051  58.634
##
## Random effects:
##      Groups   Name                Variance Std.Dev. Corr
##      zcta     (Intercept)  0.07454   0.2730
##              post_floyd1  0.68149   0.8255  -0.01
##      Residual                    5.41728   2.3275
## Number of obs: 5720, groups:  zcta, 22
```



```
##
## Fixed effects:
##
```

	Estimate	Std. Error	df	t value
## (Intercept)	1.411e-01	1.362e-01	8.316e+01	1.036
## t	1.699e-03	5.481e-04	5.672e+03	3.100
## post_floyd1	2.441e+00	3.675e-01	2.247e+02	6.641
## t_post_floyd	-4.597e-02	1.021e-02	5.620e+03	-4.500
## state_of_emerg1	-1.710e+00	3.056e-01	5.614e+03	-5.594
## stay_at_home1	1.971e+00	3.158e-01	5.610e+03	6.240
## uof_lag	-3.274e-02	1.145e-02	3.727e+02	-2.859
## stops_lag	2.912e-02	4.796e-03	5.559e+01	6.072
## shoot_lag	-6.303e-01	2.460e+00	5.652e+03	-0.256
## tmax_f	-2.501e-03	1.793e-03	5.623e+03	-1.395
## snow_in	-3.285e-02	8.902e-02	5.607e+03	-0.369
## precip_in	5.073e-01	2.989e-01	5.608e+03	1.697
## conc_dis	-1.055e-01	7.015e-02	5.279e+00	-1.505
## dplyr::lag(black_etch_incid_c, 1)	1.787e-03	1.329e-02	5.538e+03	0.134
## dplyr::lag(black_etch_incid_c, 2)	-1.261e-02	1.317e-02	5.590e+03	-0.957
## dplyr::lag(black_etch_incid_c, 3)	2.312e-03	1.314e-02	5.552e+03	0.176
## post_floyd1:conc_dis	-2.924e-01	2.004e-01	2.004e+01	-1.459

```
## Pr(>|t|)
## (Intercept) 0.30336
## t 0.00194 **
## post_floyd1 2.31e-10 ***
## t_post_floyd 6.93e-06 ***
## state_of_emerg1 2.32e-08 ***
## stay_at_home1 4.69e-10 ***
## uof_lag 0.00449 **
## stops_lag 1.19e-07 ***
## shoot_lag 0.79779
## tmax_f 0.16303
## snow_in 0.71215
## precip_in 0.08971 .
## conc_dis 0.18975
## dplyr::lag(black_etch_incid_c, 1) 0.89306
## dplyr::lag(black_etch_incid_c, 2) 0.33836
## dplyr::lag(black_etch_incid_c, 3) 0.86039
## post_floyd1:conc_dis 0.16020
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling

re_int_white_alcohol <- lmer(white_etch_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+conc_dis+
  post_floyd:conc_dis+
  dplyr::lag(white_etch_incid_c, 1)+ dplyr::lag(white_etch_incid_c, 2)+
  dplyr::lag(white_etch_incid_c, 3)+
  (1+post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling

summary(re_int_white_alcohol)

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: white_etch_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
```



```

##      stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##      snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(white_eto_h_incid_c,
##      1) + dplyr::lag(white_eto_h_incid_c, 2) + dplyr::lag(white_eto_h_incid_c,
##      3) + (1 + post_floyd | zcta)
##      Data: panel
##
## REML criterion at convergence: 9745.1
##
## Scaled residuals:
##      Min      1Q  Median      3Q      Max
## -3.9006 -0.1693 -0.0299  0.1160 27.5011
##
## Random effects:
##      Groups   Name                Variance Std.Dev. Corr
##      zcta      (Intercept) 0.095605 0.30920
##      post_floyd1 0.003768 0.06138  1.00
##      Residual      0.310703 0.55741
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)      2.126e-02  7.230e-02  2.252e+01  0.294
## t                  8.704e-04  1.350e-04  5.233e+03  6.447
## post_floyd1      -9.554e-02  7.832e-02  2.098e+03 -1.220
## t_post_floyd     -4.788e-03  2.429e-03  5.680e+03 -1.971
## state_of_emerg1    7.230e-02  7.319e-02  5.679e+03  0.988
## stay_at_home1     -7.142e-02  7.558e-02  5.678e+03 -0.945
## uof_lag          -1.408e-02  2.940e-03  4.247e+03 -4.788
## stops_lag         8.200e-03  1.319e-03  1.534e+03  6.215
## shoot_lag        -7.824e-02  5.828e-01  5.679e+03 -0.134
## tmax_f           1.242e-03  4.303e-04  5.679e+03  2.886
## snow_in           4.213e-02  2.134e-02  5.678e+03  1.974
## precip_in         6.041e-02  7.158e-02  5.678e+03  0.844
## conc_dis          -1.237e-01  5.458e-02  4.249e+01 -2.266
## dplyr::lag(white_eto_h_incid_c, 1) -8.190e-03  1.315e-02  5.699e+03 -0.623
## dplyr::lag(white_eto_h_incid_c, 2)  9.816e-03  1.316e-02  5.700e+03  0.746
## dplyr::lag(white_eto_h_incid_c, 3)  4.693e-03  1.315e-02  5.699e+03  0.357
## post_floyd1:conc_dis -1.674e-02  2.398e-02  1.387e+02 -0.698
##
##              Pr(>|t|)
## (Intercept)      0.77135
## t                  1.24e-10 ***
## post_floyd1       0.22266
## t_post_floyd      0.04875 *
## state_of_emerg1    0.32327
## stay_at_home1     0.34475
## uof_lag           1.74e-06 ***
## stops_lag         6.61e-10 ***
## shoot_lag         0.89322
## tmax_f            0.00392 **
## snow_in           0.04842 *
## precip_in         0.39874
## conc_dis          0.02858 *
## dplyr::lag(white_eto_h_incid_c, 1) 0.53354
## dplyr::lag(white_eto_h_incid_c, 2) 0.45593
## dplyr::lag(white_eto_h_incid_c, 3) 0.72129
## post_floyd1:conc_dis 0.48648
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)

```

```
## boundary (singular) fit: see help('isSingular')
re_int_latin_alcohol <- lmer(latin_etoh_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+conc_dis+
  post_floyd:conc_dis+
  dplyr::lag(latin_etoh_incid_c, 1)+ dplyr::lag(latin_etoh_incid_c, 2)+
  dplyr::lag(latin_etoh_incid_c, 3)+
  (1+post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling
summary(re_int_latin_alcohol)

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: latin_etoh_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(latin_etoh_incid_c,
##   1) + dplyr::lag(latin_etoh_incid_c, 2) + dplyr::lag(latin_etoh_incid_c,
##   3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 27028
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -2.566 -0.096 -0.038  0.022  50.504
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)  0.64592   0.8037
##           post_floyd1  0.07039   0.2653   0.02
## Residual                    7.68021   2.7713
## Number of obs: 5516, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)    1.887e-01  2.300e-01  4.054e+01   0.820
## t              2.071e-03  6.810e-04  5.409e+03   3.040
## post_floyd1    1.399e-01  3.883e-01  1.095e+03   0.360
## t_post_floyd   -4.602e-03  1.209e-02  5.456e+03  -0.381
## state_of_emerg1 -3.212e-01  3.643e-01  5.459e+03  -0.882
## stay_at_home1   2.763e-01  3.759e-01  5.454e+03   0.735
## uof_lag         1.115e-01  2.205e-02  5.098e+03   5.055
## stops_lag      -3.763e-02  8.822e-03  1.416e+02  -4.266
## shoot_lag      -1.799e+00  2.906e+00  5.459e+03  -0.619
## tmax_f          2.081e-04  2.173e-03  5.459e+03   0.096
## snow_in        -1.285e-01  1.070e-01  5.454e+03  -1.201
## precip_in       6.612e-02  3.616e-01  5.454e+03   0.183
## conc_dis       -4.206e-01  1.730e-01  1.909e+01  -2.431
## dplyr::lag(latin_etoh_incid_c, 1)  8.217e-04  1.344e-02  5.480e+03   0.061
## dplyr::lag(latin_etoh_incid_c, 2) -4.052e-03  1.345e-02  5.489e+03  -0.301
## dplyr::lag(latin_etoh_incid_c, 3)  5.004e-03  1.344e-02  5.480e+03   0.372
## post_floyd1:conc_dis -3.784e-02  1.272e-01  1.431e+01  -0.298
##
## Pr(>|t|)
## (Intercept)    0.41692
## t              0.00237 **
```

```
## post_floyd1                0.71877
## t_post_floyd               0.70339
## state_of_emerg1            0.37804
## stay_at_home1              0.46236
## uof_lag                     4.46e-07 ***
## stops_lag                   3.62e-05 ***
## shoot_lag                   0.53584
## tmax_f                      0.92373
## snow_in                     0.22980
## precip_in                   0.85493
## conc_dis                    0.02509 *
## dplyr::lag(latin_eto_h_incid_c, 1) 0.95125
## dplyr::lag(latin_eto_h_incid_c, 2) 0.76324
## dplyr::lag(latin_eto_h_incid_c, 3) 0.70959
## post_floyd1:conc_dis          0.77029
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
```

```
#specifying varcov objects from model estimates
```

```
var_re_white_alcohol <- VarCorr(re_white_alcohol)
var_re_int_white_alcohol <- VarCorr(re_int_white_alcohol)
var_re_black_alcohol <- VarCorr(re_blk_alcohol)
var_re_int_black_alcohol <- VarCorr(re_int_blk_alcohol)
var_re_latin_alcohol <- VarCorr(re_latin_alcohol)
var_re_int_latin_alcohol <- VarCorr(re_int_latin_alcohol)
class(re_white_alcohol) <- "lmerMod"
class(re_blk_alcohol) <- "lmerMod"
class(re_latin_alcohol) <- "lmerMod"
class(re_int_blk_alcohol) <- "lmerMod"
class(re_int_white_alcohol) <- "lmerMod"
class(re_int_blk_alcohol) <- "lmerMod"
class(re_int_latin_alcohol) <- "lmerMod"

(re_coef_map_white_alcohol+re_coef_map_blk_alcohol)/(re_coef_map_latin_alcohol+cd_map)
```

Figure A13: RE Coefficients–Whit Figure A14: RE Coefficients–Black Res

Rate per 1,000

Rate per 1,000

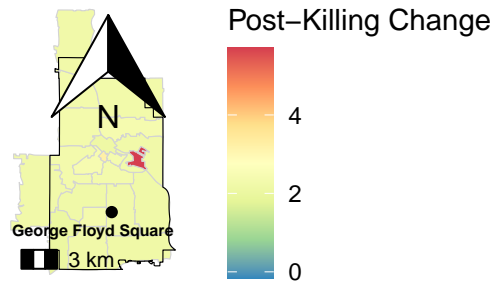
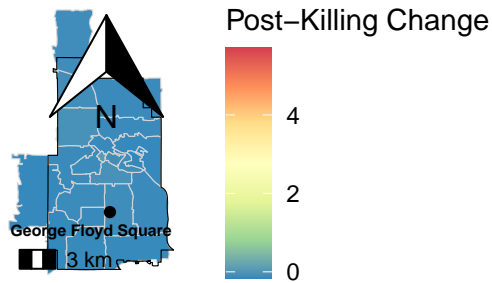
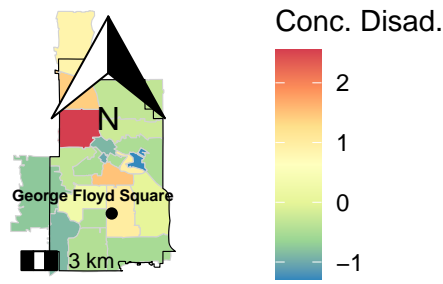
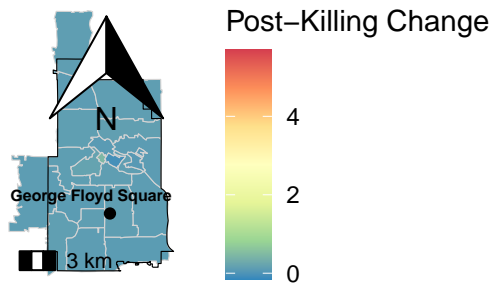


Figure A15: RE Coefficients–Latir Figure 6: Concentrated Disadvantage

Rate per 1,000

Standard Deviation Units



```
#RE random coefficient model
re_chronic <- lmer(depress_incid_c~t+post_floyd+t_post_floyd+
                  state_of_emerg+stay_at_home+
                  uof_lag+stops_lag+shoot_lag+
                  tmax_f+snow_in+precip_in+
                  conc_dis+
                  dplyr::lag(depress_incid_c, 1)+ dplyr::lag(depress_incid_c, 2)+
                  dplyr::lag(depress_incid_c, 3)+
                  (post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_chronic)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: depress_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
## stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
## snow_in + precip_in + conc_dis + dplyr::lag(depress_incid_c,
## 1) + dplyr::lag(depress_incid_c, 2) + dplyr::lag(depress_incid_c,
## 3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 14185.8
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -6.2064 -0.1911 -0.0244  0.1553 13.3774
##
## Random effects:
```

```
## Groups      Name      Variance Std.Dev. Corr
## zcta        (Intercept) 0.9935   0.9968
##            post_floyd1 0.1837   0.4286  -1.00
## Residual                0.6735   0.8207
## Number of obs: 5720, groups: zcta, 22
##
## Fixed effects:
##
##            Estimate Std. Error      df t value
## (Intercept)      9.190e-01  2.180e-01  2.269e+01  4.216
## t                -2.067e-04  1.942e-04  5.640e+03  -1.064
## post_floyd1       5.788e-02  1.458e-01  1.050e+02   0.397
## t_post_floyd     -1.435e-02  3.586e-03  5.683e+03  -4.001
## state_of_emerg1  -7.136e-02  1.078e-01  5.683e+03  -0.662
## stay_at_home1    -1.565e-01  1.113e-01  5.683e+03  -1.406
## uof_lag           3.964e-03  4.427e-03  5.671e+03   0.895
## stops_lag         3.142e-03  2.092e-03  5.621e+03   1.502
## shoot_lag        -2.411e-02  8.580e-01  5.683e+03  -0.028
## tmax_f            9.661e-05  6.323e-04  5.683e+03   0.153
## snow_in           3.065e-02  3.139e-02  5.683e+03   0.976
## precip_in        -6.959e-02  1.054e-01  5.683e+03  -0.660
## conc_dis          6.587e-02  5.986e-02  1.645e+02   1.101
## dplyr::lag(depress_incid_c, 1) -3.512e-03  1.324e-02  5.704e+03  -0.265
## dplyr::lag(depress_incid_c, 2)  2.352e-03  1.324e-02  5.704e+03   0.178
## dplyr::lag(depress_incid_c, 3) -7.025e-04  1.324e-02  5.704e+03  -0.053
##
##            Pr(>|t|)
## (Intercept)      0.000337 ***
## t                0.287299
## post_floyd1       0.692243
## t_post_floyd       6.4e-05 ***
## state_of_emerg1    0.507896
## stay_at_home1      0.159873
## uof_lag            0.370582
## stops_lag          0.133241
## shoot_lag          0.977582
## tmax_f             0.878568
## snow_in            0.328913
## precip_in          0.509030
## conc_dis           0.272717
## dplyr::lag(depress_incid_c, 1) 0.790773
## dplyr::lag(depress_incid_c, 2) 0.859029
## dplyr::lag(depress_incid_c, 3) 0.957673
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_blk_chronic <- lmer(black_chronic_incid_c~t+post_floyd+t_post_floyd+
                      state_of_emerg+stay_at_home+
                      uof_lag+stops_lag+shoot_lag+
                      tmax_f+snow_in+precip_in+
                      conc_dis+
                      dplyr::lag(black_chronic_incid_c, 1)+ dplyr::lag(black_chronic_incid_c, 2)+
                      dplyr::lag(black_chronic_incid_c, 3)+
                      (post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_blk_chronic)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## black_chronic_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + dplyr::lag(black_chronic_incid_c,
##   1) + dplyr::lag(black_chronic_incid_c, 2) + dplyr::lag(black_chronic_incid_c,
##   3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: -125.6
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -0.769 -0.051 -0.025 -0.003 52.496
##
## Random effects:
##   Groups      Name                Variance Std.Dev.  Corr
##   zcta        (Intercept) 2.963e-12 1.721e-06
##               post_floyd1 6.259e-11 7.911e-06 -0.49
## Residual                    5.601e-02 2.367e-01
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##                                     Estimate Std. Error      df t value
## (Intercept)                    -1.391e-02  1.250e-02  5.704e+03  -1.113
## t                               8.632e-05  5.538e-05  5.704e+03   1.559
## post_floyd1                     -5.701e-03  3.276e-02  5.704e+03  -0.174
## t_post_floyd                    3.180e-04  1.030e-03  5.704e+03   0.309
## state_of_emerg1                 -1.456e-02  3.107e-02  5.704e+03  -0.469
## stay_at_home1                   9.095e-03  3.208e-02  5.704e+03   0.283
## uof_lag                         -1.462e-03  1.065e-03  5.704e+03  -1.373
## stops_lag                       1.805e-03  3.802e-04  5.704e+03   4.749
## shoot_lag                       -5.127e-03  2.469e-01  5.704e+03  -0.021
## tmax_f                          1.824e-04  1.823e-04  5.704e+03   1.001
## snow_in                        -3.290e-03  9.052e-03  5.704e+03  -0.363
## precip_in                       -9.527e-03  3.038e-02  5.704e+03  -0.314
## conc_dis                       -1.679e-03  3.318e-03  5.704e+03  -0.506
## dplyr::lag(black_chronic_incid_c, 1) -2.280e-03  1.321e-02  5.704e+03  -0.173
## dplyr::lag(black_chronic_incid_c, 2) -1.730e-03  1.322e-02  5.704e+03  -0.131
## dplyr::lag(black_chronic_incid_c, 3) -1.914e-03  1.321e-02  5.704e+03  -0.145
##                                     Pr(>|t|)
## (Intercept)                        0.266
## t                                  0.119
## post_floyd1                        0.862
## t_post_floyd                       0.758
## state_of_emerg1                    0.639
## stay_at_home1                      0.777
## uof_lag                            0.170
## stops_lag                          2.1e-06 ***
## shoot_lag                          0.983
## tmax_f                             0.317
## snow_in                            0.716
## precip_in                          0.754
## conc_dis                           0.613
## dplyr::lag(black_chronic_incid_c, 1) 0.863
## dplyr::lag(black_chronic_incid_c, 2) 0.896
## dplyr::lag(black_chronic_incid_c, 3) 0.885
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_white_chronic <- lmer(white_chronic_incid_c~t+post_floyd+t_post_floyd+
                        state_of_emerg+stay_at_home+
                        uof_lag+stops_lag+shoot_lag+
                        tmax_f+snow_in+precip_in+
                        conc_dis+
                        dplyr::lag(white_chronic_incid_c, 1)+ dplyr::lag(white_chronic_incid_c, 2)+
                        dplyr::lag(white_chronic_incid_c, 3)+
                        (post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_white_chronic)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## white_chronic_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + dplyr::lag(white_chronic_incid_c,
## 1) + dplyr::lag(white_chronic_incid_c, 2) + dplyr::lag(white_chronic_incid_c,
## 3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: -19178.6
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -2.331 -0.079 -0.050 -0.022  68.682
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)  6.949e-06 0.002636
##           post_floyd1  3.519e-04 0.018760 1.00
## Residual                1.972e-03 0.044405
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)  2.279e-04  2.412e-03 6.626e+02  0.094
## t            1.717e-05  1.039e-05 5.683e+03  1.653
## post_floyd1  1.376e-02  7.340e-03 1.638e+02  1.875
## t_post_floyd -7.596e-04  1.940e-04 5.681e+03 -3.915
## state_of_emerg1 1.870e-03  5.829e-03 5.681e+03  0.321
## stay_at_home1 -4.479e-03  6.020e-03 5.681e+03 -0.744
## uof_lag       -6.590e-04  2.043e-04 3.073e+03 -3.225
## stops_lag     -1.380e-04  7.366e-05 1.013e+03 -1.873
## shoot_lag     -5.550e-03  4.637e-02 5.684e+03 -0.120
## tmax_f        2.752e-05  3.420e-05 5.681e+03  0.805
## snow_in       2.302e-04  1.698e-03 5.681e+03  0.136
## precip_in    -6.276e-03  5.702e-03 5.681e+03 -1.101
## conc_dis      8.224e-04  7.771e-04 6.048e+01  1.058
## dplyr::lag(white_chronic_incid_c, 1) -1.046e-02  1.321e-02 5.651e+03 -0.792
## dplyr::lag(white_chronic_incid_c, 2) -5.988e-03  1.321e-02 5.651e+03 -0.453
```

```
## dplyr::lag(white_chronic_incid_c, 3) -3.834e-03  1.321e-02  5.649e+03  -0.290
##                                     Pr(>|t|)
## (Intercept)                        0.92476
## t                                  0.09834 .
## post_floyd1                        0.06263 .
## t_post_floyd                      9.16e-05 ***
## state_of_emerg1                   0.74835
## stay_at_home1                    0.45693
## uof_lag                           0.00127 **
## stops_lag                         0.06129 .
## shoot_lag                         0.90473
## tmax_f                            0.42094
## snow_in                          0.89220
## precip_in                        0.27115
## conc_dis                          0.29415
## dplyr::lag(white_chronic_incid_c, 1) 0.42835
## dplyr::lag(white_chronic_incid_c, 2) 0.65039
## dplyr::lag(white_chronic_incid_c, 3) 0.77169
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
re_latin_chronic <- lmer(latin_chronic_incid_c~t+post_floyd+t_post_floyd+
                        state_of_emerg+stay_at_home+
                        uof_lag+stops_lag+shoot_lag+
                        tmax_f+snow_in+precip_in+
                        conc_dis+
                        dplyr::lag(latin_chronic_incid_c, 1)+ dplyr::lag(latin_chronic_incid_c, 2)+
                        dplyr::lag(latin_chronic_incid_c, 3)+
                        (post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Model failed to converge with 1 negative eigenvalue: -2.0e+00
```

```
summary(re_latin_chronic)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## latin_chronic_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + dplyr::lag(latin_chronic_incid_c,
##   1) + dplyr::lag(latin_chronic_incid_c, 2) + dplyr::lag(latin_chronic_incid_c,
##   3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: -21117.3
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -2.057 -0.051 -0.028 -0.010  45.434
##
## Random effects:
##   Groups      Name                Variance Std.Dev. Corr
##   zcta       (Intercept) 0.0000000 0.000000
```



```
##          post_floyd1 0.0002371 0.01540   NaN
## Residual          0.0012239 0.03498
## Number of obs: 5516, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)    -3.846e-04  1.908e-03  5.479e+03  -0.202
## t              1.032e-05  8.489e-06  5.479e+03   1.216
## post_floyd1    -3.241e-03  5.854e-03  1.544e+02  -0.554
## t_post_floyd   -2.615e-04  1.526e-04  5.479e+03  -1.713
## state_of_emerg1  9.675e-03  4.602e-03  5.479e+03   2.102
## stay_at_home1  -6.502e-03  4.748e-03  5.479e+03  -1.370
## uof_lag        -2.121e-05  2.754e-04  5.463e+03  -0.077
## stops_lag      -2.775e-05  6.869e-05  5.447e+03  -0.404
## shoot_lag      -2.690e-03  3.663e-02  5.480e+03  -0.073
## tmax_f         3.939e-06  2.742e-05  5.479e+03   0.144
## snow_in        -1.155e-03  1.350e-03  5.479e+03  -0.855
## precip_in      2.280e-03  4.565e-03  5.479e+03   0.500
## conc_dis       1.208e-04  5.293e-04  1.144e+03   0.228
## dplyr::lag(latin_chronic_incid_c, 1) -3.748e-03  1.348e-02  5.500e+03  -0.278
## dplyr::lag(latin_chronic_incid_c, 2) -3.747e-03  1.348e-02  5.500e+03  -0.278
## dplyr::lag(latin_chronic_incid_c, 3) -3.816e-03  1.348e-02  5.500e+03  -0.283
##
##              Pr(>|t|)
## (Intercept)    0.8403
## t              0.2240
## post_floyd1    0.5807
## t_post_floyd   0.0867 .
## state_of_emerg1 0.0356 *
## stay_at_home1  0.1709
## uof_lag        0.9386
## stops_lag      0.6863
## shoot_lag      0.9414
## tmax_f         0.8858
## snow_in        0.3924
## precip_in      0.6174
## conc_dis       0.8195
## dplyr::lag(latin_chronic_incid_c, 1) 0.7810
## dplyr::lag(latin_chronic_incid_c, 2) 0.7811
## dplyr::lag(latin_chronic_incid_c, 3) 0.7772
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
#extract random coefficients
```

```
re_pf_white_chronic <- as.data.frame(coef(re_white_chronic)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_white = post_floyd1)

re_pf_blk_chronic <- as.data.frame(coef(re_blk_chronic)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_blk = post_floyd1)

re_pf_latin_chronic <- as.data.frame(coef(re_latin_chronic)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_latin = post_floyd1)
```

```

#aggregate to zip-level over years
zip_level_chronic <- panel %>%
  group_by(zcta) %>%
    summarize(mh_all_tot = sum(mh_all_tot, na.rm = T),
              total_pop = sum(total_pop, na.rm = T),
              conc_dis = mean(conc_dis, na.rm = T)) %>%
  mutate(mh_incid_c = (mh_all_tot/total_pop)*1000) %>%
  ungroup() %>%
  left_join(zcta, by = "zcta")

zip_level_chronic <- zip_level_chronic %>%
  left_join(re_pf_white_chronic, by = c("zcta" = "zipcode")) %>%
  left_join(re_pf_blk_chronic, by = c("zcta" = "zipcode")) %>%
  left_join(re_pf_latin_chronic, by = c("zcta" = "zipcode"))

re_coef_map_white_chronic <- ggplot() +
  geom_sf(data = zip_level_chronic, aes(geometry = geometry, fill = post_floyd1_white), color = "lightgrey") +
  geom_sf(data = mpl, aes(geometry = geometry), color = "black", alpha = 0) +
  geom_sf(data = gfs, aes(geometry = geometry), color = "black") +
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold") +
  scale_fill_distiller(palette = "Spectral",
                       limits = c(min(zip_level_chronic$post_floyd1_latin),
                                   max(zip_level_chronic$post_floyd1_white))) +
  labs(title = "Figure 3: RE Coefficients-White Residents",
        subtitle = "Rate per 1,000",
        fill = "Post-Killing Change") +
  theme(axis.text.x = element_blank(),
        axis.text.y = element_blank(),
        axis.line = element_blank(),
        axis.ticks = element_blank(),
        panel.border = element_blank(),
        panel.grid = element_blank(),
        axis.title = element_blank(),
        panel.background = element_blank(),
        panel.grid.major = element_line(colour="transparent"),
        plot.subtitle = element_text(face="italic"),
        strip.background = element_rect(fill = "white",
                                         colour = "black")) +
  ggspatial::annotation_scale() +
  ggspatial::annotation_north_arrow(which_north = "true",
                                    location = "tr")

re_coef_map_blk_chronic <- ggplot() +
  geom_sf(data = zip_level_chronic, aes(geometry = geometry, fill = post_floyd1_blk), color = "lightgrey") +
  geom_sf(data = mpl, aes(geometry = geometry), color = "black", alpha = 0) +
  geom_sf(data = gfs, aes(geometry = geometry), color = "black") +
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold") +
  scale_fill_distiller(palette = "Spectral",
                       limits = c(min(zip_level_chronic$post_floyd1_latin),
                                   max(zip_level_chronic$post_floyd1_white))) +
  labs(title = "Figure 4: RE Coefficients-Black Residents",
        subtitle = "Rate per 1,000",
        fill = "Post-Killing Change") +

```

```

theme(axis.text.x = element_blank(),
      axis.text.y = element_blank(),
      axis.line = element_blank(),
      axis.ticks = element_blank(),
      panel.border = element_blank(),
      panel.grid = element_blank(),
      axis.title = element_blank(),
      panel.background = element_blank(),
      panel.grid.major = element_line(colour="transparent"),
      plot.subtitle = element_text(face="italic"),
      strip.background = element_rect(fill = "white",
                                      colour = "black"))+
ggspatial::annotation_scale()+
ggspatial::annotation_north_arrow(which_north = "true",
                                  location = "tr")

re_coef_map_latin_chronic <- ggplot() +
  geom_sf(data = zip_level_chronic, aes(geometry = geometry, fill = post_floyd1_latin), color = "lightgrey") +
  geom_sf(data = mpl, aes(geometry = geometry), color = "black", alpha = 0)+
  geom_sf(data = gfs, aes(geometry = geometry), color = "black")+
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold")+
  scale_fill_distiller(palette = "Spectral",
                       limits = c(min(zip_level_chronic$post_floyd1_latin),
                                   max(zip_level_chronic$post_floyd1_white)))+
  labs(title = "Figure 5: RE Coefficients-Latine Residents",
        subtitle = "Rate per 1,000",
        fill = "Post-Killing Change")+
  theme(axis.text.x = element_blank(),
        axis.text.y = element_blank(),
        axis.line = element_blank(),
        axis.ticks = element_blank(),
        panel.border = element_blank(),
        panel.grid = element_blank(),
        axis.title = element_blank(),
        panel.background = element_blank(),
        panel.grid.major = element_line(colour="transparent"),
        plot.subtitle = element_text(face="italic"),
        strip.background = element_rect(fill = "white",
                                         colour = "black"))+
  ggspatial::annotation_scale()+
  ggspatial::annotation_north_arrow(which_north = "true",
                                    location = "tr")

#RE random coefficient model - interaction
re_int_chronic <- lmer(depress_incid_c~t+post_floyd+t_post_floyd+
                      state_of_emerg+stay_at_home+
                      uof_lag+stops_lag+shoot_lag+
                      tmax_f+snow_in+precip_in+conc_dis+
                      post_floyd:conc_dis+
                      dplyr::lag(depress_incid_c, 1)+ dplyr::lag(depress_incid_c, 2)+
                      dplyr::lag(depress_incid_c, 3)+
                      (1+post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling

```

```
summary(re_int_chronic)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: depress_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(depress_incid_c,
##   1) + dplyr::lag(depress_incid_c, 2) + dplyr::lag(depress_incid_c,
##   3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 14183.6
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -6.1963 -0.1897 -0.0260  0.1564 13.3722
##
## Random effects:
##   Groups      Name      Variance Std.Dev. Corr
##   zcta      (Intercept) 1.1265   1.0614
##             post_floyd1 0.2104   0.4587  -1.00
## Residual              0.6726   0.8201
## Number of obs: 5720, groups: zcta, 22
##
## Fixed effects:
##              Estimate Std. Error      df t value
## (Intercept)    9.029e-01  2.315e-01  2.101e+01   3.900
## t              -9.307e-05  1.995e-04  5.293e+03  -0.467
## post_floyd1     4.998e-02  1.499e-01  8.591e+01   0.333
## t_post_floyd   -1.451e-02  3.585e-03  5.683e+03  -4.047
## state_of_emerg1 -6.733e-02  1.077e-01  5.682e+03  -0.625
## stay_at_home1   -1.575e-01  1.113e-01  5.681e+03  -1.416
## uof_lag         3.112e-03  4.435e-03  5.676e+03   0.702
## stops_lag       3.847e-03  2.117e-03  5.503e+03   1.817
## shoot_lag      -4.723e-02  8.575e-01  5.681e+03  -0.055
## tmax_f          8.347e-05  6.319e-04  5.681e+03   0.132
## snow_in         3.081e-02  3.137e-02  5.681e+03   0.982
## precip_in      -7.265e-02  1.053e-01  5.681e+03  -0.690
## conc_dis        3.346e-01  1.253e-01  2.483e+02   2.671
## dplyr::lag(depress_incid_c, 1) -3.595e-03  1.323e-02  5.703e+03  -0.272
## dplyr::lag(depress_incid_c, 2)  2.015e-03  1.324e-02  5.703e+03   0.152
## dplyr::lag(depress_incid_c, 3)  1.017e-04  1.323e-02  5.703e+03   0.008
## post_floyd1:conc_dis -1.620e-01  6.631e-02  1.190e+02  -2.443
##
##              Pr(>|t|)
## (Intercept)  0.000825 ***
## t            0.640813
## post_floyd1  0.739647
## t_post_floyd 5.26e-05 ***
## state_of_emerg1 0.531943
## stay_at_home1  0.156946
## uof_lag        0.482989
## stops_lag      0.069256 .
## shoot_lag      0.956076
## tmax_f         0.894923
## snow_in        0.326156
## precip_in      0.490310
## conc_dis       0.008056 **
## dplyr::lag(depress_incid_c, 1) 0.785869
## dplyr::lag(depress_incid_c, 2) 0.879023
## dplyr::lag(depress_incid_c, 3) 0.993872
## post_floyd1:conc_dis 0.016035 *
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_int_blk_chronic <- lmer(black_chronic_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+conc_dis+
  post_floyd:conc_dis+
  dplyr::lag(black_chronic_incid_c, 1)+ dplyr::lag(black_chronic_incid_c, 2)+
  dplyr::lag(black_chronic_incid_c, 3)+
  (1+post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling

summary(re_int_blk_chronic)

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## black_chronic_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(black_chronic_incid_c,
## 1) + dplyr::lag(black_chronic_incid_c, 2) + dplyr::lag(black_chronic_incid_c,
## 3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: -118.4
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -0.769 -0.051 -0.025 -0.003  52.491
##
## Random effects:
##   Groups   Name                Variance Std.Dev.  Corr
##   zcta     (Intercept)  0.000e+00 0.000e+00
##           post_floyd1  5.002e-12 2.236e-06  NaN
## Residual                    5.602e-02 2.367e-01
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)  -1.387e-02  1.250e-02 5.703e+03  -1.110
## t              8.615e-05  5.538e-05 5.703e+03   1.555
## post_floyd1   -5.511e-03  3.276e-02 5.703e+03  -0.168
## t_post_floyd   3.184e-04  1.030e-03 5.703e+03   0.309
## state_of_emerg -1.458e-02  3.107e-02 5.703e+03  -0.469
## stay_at_home1   9.096e-03  3.209e-02 5.703e+03   0.283
## uof_lag        -1.462e-03  1.065e-03 5.703e+03  -1.372
## stops_lag       1.800e-03  3.804e-04 5.703e+03   4.733
## shoot_lag      -4.253e-03  2.469e-01 5.703e+03  -0.017
## tmax_f         1.825e-04  1.823e-04 5.703e+03   1.001
## snow_in       -3.291e-03  9.053e-03 5.703e+03  -0.363
## precip_in     -9.522e-03  3.039e-02 5.703e+03  -0.313
## conc_dis      -2.215e-03  3.562e-03 5.703e+03  -0.622
## dplyr::lag(black_chronic_incid_c, 1) -2.307e-03  1.321e-02 5.703e+03  -0.175
```

```
## dplyr::lag(black_chronic_incid_c, 2) -1.682e-03 1.322e-02 5.703e+03 -0.127
## dplyr::lag(black_chronic_incid_c, 3) -1.917e-03 1.321e-02 5.703e+03 -0.145
## post_floyd1:conc_dis 3.973e-03 9.615e-03 5.703e+03 0.413
## Pr(>|t|)
## (Intercept) 0.267
## t 0.120
## post_floyd1 0.866
## t_post_floyd 0.757
## state_of_emerg1 0.639
## stay_at_home1 0.777
## uof_lag 0.170
## stops_lag 2.27e-06 ***
## shoot_lag 0.986
## tmax_f 0.317
## snow_in 0.716
## precip_in 0.754
## conc_dis 0.534
## dplyr::lag(black_chronic_incid_c, 1) 0.861
## dplyr::lag(black_chronic_incid_c, 2) 0.899
## dplyr::lag(black_chronic_incid_c, 3) 0.885
## post_floyd1:conc_dis 0.680
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
re_int_white_chronic <- lmer(white_chronic_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+conc_dis+
  post_floyd:conc_dis+
  dplyr::lag(white_chronic_incid_c, 1)+ dplyr::lag(white_chronic_incid_c, 2)+
  dplyr::lag(white_chronic_incid_c, 3)+
  (1+post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_int_white_chronic)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## white_chronic_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
## stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
## snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(white_chronic_incid_c,
## 1) + dplyr::lag(white_chronic_incid_c, 2) + dplyr::lag(white_chronic_incid_c,
## 3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: -19171
##
## Scaled residuals:
## Min 1Q Median 3Q Max
## -2.342 -0.080 -0.050 -0.021 68.671
##
## Random effects:
## Groups Name Variance Std.Dev. Corr
```

```
## zcta      (Intercept) 6.795e-06 0.002607
##          post_floyd1 3.430e-04 0.018520 1.00
## Residual          1.972e-03 0.044405
## Number of obs: 5720, groups: zcta, 22
##
## Fixed effects:
##
##          Estimate Std. Error      df t value
## (Intercept)      2.520e-04  2.411e-03 6.733e+02   0.105
## t                1.693e-05  1.039e-05 5.688e+03   1.630
## post_floyd1      1.351e-02  7.316e-03 1.604e+02   1.847
## t_post_floyd     -7.593e-04  1.940e-04 5.681e+03  -3.913
## state_of_emerg1   1.866e-03  5.829e-03 5.681e+03   0.320
## stay_at_home1     -4.475e-03  6.021e-03 5.681e+03  -0.743
## uof_lag           -6.545e-04  2.044e-04 3.018e+03  -3.203
## stops_lag         -1.368e-04  7.366e-05 9.959e+02  -1.857
## shoot_lag         -5.563e-03  4.637e-02 5.684e+03  -0.120
## tmax_f            2.752e-05  3.420e-05 5.681e+03   0.805
## snow_in           2.299e-04  1.698e-03 5.681e+03   0.135
## precip_in        -6.270e-03  5.702e-03 5.681e+03  -1.100
## conc_dis          3.254e-04  8.808e-04 1.229e+01   0.369
## dplyr::lag(white_chronic_incid_c, 1) -1.063e-02  1.321e-02 5.650e+03  -0.805
## dplyr::lag(white_chronic_incid_c, 2) -5.708e-03  1.321e-02 5.649e+03  -0.432
## dplyr::lag(white_chronic_incid_c, 3) -3.820e-03  1.321e-02 5.647e+03  -0.289
## post_floyd1:conc_dis -5.124e-03  4.305e-03 2.039e+01  -1.190
##
##          Pr(>|t|)
## (Intercept)      0.91676
## t                0.10319
## post_floyd1      0.06664 .
## t_post_floyd     9.22e-05 ***
## state_of_emerg1   0.74883
## stay_at_home1     0.45735
## uof_lag           0.00137 **
## stops_lag         0.06359 .
## shoot_lag         0.90451
## tmax_f            0.42106
## snow_in           0.89233
## precip_in         0.27156
## conc_dis          0.71810
## dplyr::lag(white_chronic_incid_c, 1) 0.42089
## dplyr::lag(white_chronic_incid_c, 2) 0.66577
## dplyr::lag(white_chronic_incid_c, 3) 0.77250
## post_floyd1:conc_dis 0.24765
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_int_latin_chronic <- lmer(latin_chronic_incid_c~t+post_floyd+t_post_floyd+
                             state_of_emerg+stay_at_home+
                             uof_lag+stops_lag+shoot_lag+
                             tmax_f+snow_in+precip_in+conc_dis+
                             post_floyd:conc_dis+
                             dplyr::lag(latin_chronic_incid_c, 1)+ dplyr::lag(latin_chronic_incid_c, 2)+
                             dplyr::lag(latin_chronic_incid_c, 3)+
                             (1+post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
```



```
## rescaling
## Warning: Model failed to converge with 1 negative eigenvalue: -3.2e+00
summary(re_int_latin_chronic)

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## latin_chronic_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(latin_chronic_incid_c,
##   1) + dplyr::lag(latin_chronic_incid_c, 2) + dplyr::lag(latin_chronic_incid_c,
##   3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: -21107.9
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -2.071 -0.051 -0.028 -0.010 45.420
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept) 0.0000000 0.000000
##           post_floyd1 0.0002506 0.01583   NaN
## Residual              0.0012239 0.03498
## Number of obs: 5516, groups: zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)   -3.848e-04  1.908e-03  5.479e+03  -0.202
## t              1.033e-05  8.489e-06  5.479e+03   1.216
## post_floyd1    -3.250e-03  5.909e-03  1.392e+02  -0.550
## t_post_floyd   -2.615e-04  1.526e-04  5.479e+03  -1.713
## state_of_emerg1 9.675e-03  4.602e-03  5.479e+03   2.102
## stay_at_home1  -6.502e-03  4.748e-03  5.479e+03  -1.370
## uof_lag        -2.108e-05  2.755e-04  5.485e+03  -0.077
## stops_lag      -2.770e-05  6.871e-05  5.474e+03  -0.403
## shoot_lag      -2.690e-03  3.663e-02  5.480e+03  -0.073
## tmax_f         3.938e-06  2.742e-05  5.479e+03   0.144
## snow_in        -1.155e-03  1.350e-03  5.479e+03  -0.855
## precip_in      2.280e-03  4.565e-03  5.479e+03   0.499
## conc_dis       1.249e-04  5.351e-04  5.479e+03   0.233
## dplyr::lag(latin_chronic_incid_c, 1) -3.738e-03  1.349e-02  5.499e+03  -0.277
## dplyr::lag(latin_chronic_incid_c, 2) -3.741e-03  1.349e-02  5.499e+03  -0.277
## dplyr::lag(latin_chronic_incid_c, 3) -3.813e-03  1.349e-02  5.499e+03  -0.283
## post_floyd1:conc_dis -1.828e-04  3.674e-03  2.084e+01  -0.050
##
##              Pr(>|t|)
## (Intercept)    0.8402
## t              0.2240
## post_floyd1    0.5833
## t_post_floyd   0.0867
## state_of_emerg1 0.0356 *
## stay_at_home1  0.1709
## uof_lag        0.9390
## stops_lag      0.6868
## shoot_lag      0.9415
## tmax_f         0.8858
## snow_in        0.3924
## precip_in      0.6175
## conc_dis       0.8155
```



```
## dplyr::lag(latin_chronic_incid_c, 1) 0.7816
## dplyr::lag(latin_chronic_incid_c, 2) 0.7815
## dplyr::lag(latin_chronic_incid_c, 3) 0.7774
## post_floyd1:conc_dis 0.9608
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

*#specifying varcov objects from model estimates*

```
var_re_white_chronic <- VarCorr(re_white_chronic)
var_re_int_white_chronic <- VarCorr(re_int_white_chronic)
var_re_black_chronic <- VarCorr(re_blk_chronic)
var_re_int_black_chronic <- VarCorr(re_int_blk_chronic)
var_re_latin_chronic <- VarCorr(re_latin_chronic)
var_re_int_latin_chronic <- VarCorr(re_int_latin_chronic)
class(re_white_chronic) <- "lmerMod"
class(re_blk_chronic) <- "lmerMod"
class(re_latin_chronic) <- "lmerMod"
class(re_int_blk_chronic) <- "lmerMod"
class(re_int_white_chronic) <- "lmerMod"
class(re_int_blk_chronic) <- "lmerMod"
class(re_int_latin_chronic) <- "lmerMod"
```

```
(re_coef_map_white_chronic+re_coef_map_blk_chronic)/(re_coef_map_latin_chronic+cd_map)
```

Figure 3: RE Coefficients–White F  
Rate per 1,000

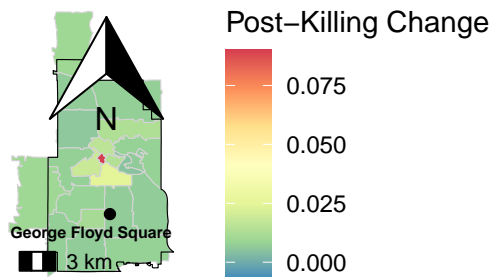


Figure 4: RE Coefficients–Black Reside  
Rate per 1,000

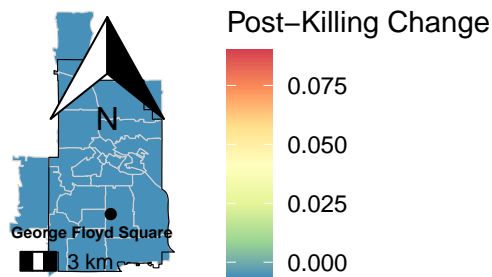


Figure 5: RE Coefficients–Latine I  
Rate per 1,000

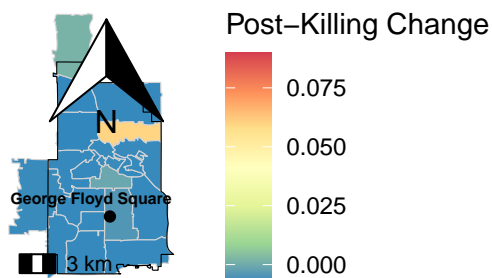
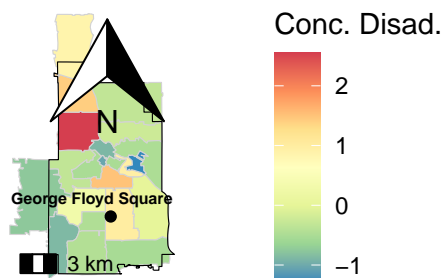


Figure 6: Concentrated Disadvantage  
Standard Deviation Units



*#RE random coefficient model*

```
re_acute <- lmer(depress_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  conc_dis+
```

```

dplyr::lag(depress_incid_c, 1)+ dplyr::lag(depress_incid_c, 2)+
dplyr::lag(depress_incid_c, 3)+
  (post_floyd|zcta), data = panel)

```

```

## Warning: Some predictor variables are on very different scales: consider
## rescaling

```

```

## Warning: Some predictor variables are on very different scales: consider
## rescaling

```

```
summary(re_acute)
```

```

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: depress_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + dplyr::lag(depress_incid_c,
##   1) + dplyr::lag(depress_incid_c, 2) + dplyr::lag(depress_incid_c,
##   3) + (post_floyd | zcta)
##   Data: panel
##
## REML criterion at convergence: 14185.8
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -6.2064 -0.1911 -0.0244  0.1553 13.3774
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept) 0.9935     0.9968
##           post_floyd1 0.1837     0.4286  -1.00
##   Residual                0.6735     0.8207
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)    9.190e-01  2.180e-01  2.269e+01   4.216
## t              -2.067e-04  1.942e-04  5.640e+03  -1.064
## post_floyd1     5.788e-02  1.458e-01  1.050e+02   0.397
## t_post_floyd   -1.435e-02  3.586e-03  5.683e+03  -4.001
## state_of_emerg1 -7.136e-02  1.078e-01  5.683e+03  -0.662
## stay_at_home1  -1.565e-01  1.113e-01  5.683e+03  -1.406
## uof_lag         3.964e-03  4.427e-03  5.671e+03   0.895
## stops_lag       3.142e-03  2.092e-03  5.621e+03   1.502
## shoot_lag      -2.411e-02  8.580e-01  5.683e+03  -0.028
## tmax_f          9.661e-05  6.323e-04  5.683e+03   0.153
## snow_in         3.065e-02  3.139e-02  5.683e+03   0.976
## precip_in      -6.959e-02  1.054e-01  5.683e+03  -0.660
## conc_dis        6.587e-02  5.986e-02  1.645e+02   1.101
## dplyr::lag(depress_incid_c, 1) -3.512e-03  1.324e-02  5.704e+03  -0.265
## dplyr::lag(depress_incid_c, 2)  2.352e-03  1.324e-02  5.704e+03   0.178
## dplyr::lag(depress_incid_c, 3) -7.025e-04  1.324e-02  5.704e+03  -0.053
##
##              Pr(>|t|)
## (Intercept)    0.000337 ***
## t              0.287299
## post_floyd1     0.692243
## t_post_floyd    6.4e-05 ***
## state_of_emerg1 0.507896
## stay_at_home1   0.159873
## uof_lag         0.370582
## stops_lag       0.133241
## shoot_lag       0.977582

```

```

## tmax_f                0.878568
## snow_in               0.328913
## precip_in             0.509030
## conc_dis              0.272717
## dplyr::lag(depress_incid_c, 1) 0.790773
## dplyr::lag(depress_incid_c, 2) 0.859029
## dplyr::lag(depress_incid_c, 3) 0.957673
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_blk_acute <- lmer(black_acute_incid_c~t+post_floyd+t_post_floyd+
                    state_of_emerg+stay_at_home+
                    uof_lag+stops_lag+shoot_lag+
                    tmax_f+snow_in+precip_in+
                    conc_dis+
                    dplyr::lag(black_acute_incid_c, 1)+ dplyr::lag(black_acute_incid_c, 2)+
                    dplyr::lag(black_acute_incid_c, 3)+
                    (post_floyd|zcta), data = panel)

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Model failed to converge with 1 negative eigenvalue: -2.8e+03

summary(re_blk_acute)

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## black_acute_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + dplyr::lag(black_acute_incid_c,
##   1) + dplyr::lag(black_acute_incid_c, 2) + dplyr::lag(black_acute_incid_c,
##   3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: -16125.6
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -0.659 -0.095 -0.053 -0.015  46.305
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept)  0.0000000  0.000000
##           post_floyd1  0.0000485  0.006964   NaN
## Residual                0.0033891  0.058216
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error    df t value
## (Intercept)  -3.591e-04  3.074e-03 5.673e+03  -0.117
## t              4.043e-05  1.364e-05 5.672e+03   2.965
## post_floyd1   -1.852e-02  8.204e-03 1.509e+03  -2.257
## t_post_floyd   1.594e-04  2.534e-04 5.670e+03   0.629
## state_of_emerg 1.548e-02  7.651e-03 5.669e+03   2.023

```

```
## stay_at_home1 -2.066e-02 7.907e-03 5.670e+03 -2.613
## uof_lag -8.464e-06 2.627e-04 4.804e+03 -0.032
## stops_lag -6.596e-05 9.378e-05 4.875e+03 -0.703
## shoot_lag 8.019e-03 6.074e-02 5.687e+03 0.132
## tmax_f -1.974e-05 4.483e-05 5.670e+03 -0.440
## snow_in -1.456e-03 2.227e-03 5.669e+03 -0.654
## precip_in 2.642e-03 7.474e-03 5.669e+03 0.354
## conc_dis -4.701e-04 8.337e-04 2.464e+02 -0.564
## dplyr::lag(black_acute_incid_c, 1) 3.182e-03 1.326e-02 5.700e+03 0.240
## dplyr::lag(black_acute_incid_c, 2) -5.495e-03 1.324e-02 5.704e+03 -0.415
## dplyr::lag(black_acute_incid_c, 3) 1.188e-02 1.324e-02 5.704e+03 0.897
## Pr(>|t|)
## (Intercept) 0.90703
## t 0.00304 **
## post_floyd1 0.02415 *
## t_post_floyd 0.52921
## state_of_emerg1 0.04308 *
## stay_at_home1 0.00900 **
## uof_lag 0.97430
## stops_lag 0.48184
## shoot_lag 0.89498
## tmax_f 0.65972
## snow_in 0.51337
## precip_in 0.72371
## conc_dis 0.57333
## dplyr::lag(black_acute_incid_c, 1) 0.81043
## dplyr::lag(black_acute_incid_c, 2) 0.67814
## dplyr::lag(black_acute_incid_c, 3) 0.36950
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
re_white_acute <- lmer(white_acute_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+
  conc_dis+
  dplyr::lag(white_acute_incid_c, 1)+ dplyr::lag(white_acute_incid_c, 2)+
  dplyr::lag(white_acute_incid_c, 3)+
  (post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling

## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_white_acute)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## white_acute_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
## stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
## snow_in + precip_in + conc_dis + dplyr::lag(white_acute_incid_c,
## 1) + dplyr::lag(white_acute_incid_c, 2) + dplyr::lag(white_acute_incid_c,
## 3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: -19660.1
```

```
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -1.045 -0.028 -0.010  0.003 72.975
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept) 5.995e-05 0.007743
##           post_floyd1 2.501e-05 0.005001 -1.00
## Residual                1.813e-03 0.042584
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##                                     Estimate Std. Error      df t value
## (Intercept)                2.619e-03  2.795e-03  5.710e+01   0.937
## t                          5.111e-06  9.988e-06  5.693e+03   0.512
## post_floyd1                -5.835e-03  5.993e-03  1.998e+03  -0.974
## t_post_floyd               -1.150e-05  1.853e-04  5.661e+03  -0.062
## state_of_emerg1            4.770e-03  5.592e-03  5.662e+03   0.853
## stay_at_home1              1.107e-02  5.779e-03  5.660e+03   1.915
## uof_lag                    -8.237e-04  2.153e-04  8.875e+02  -3.826
## stops_lag                   -3.956e-04  9.584e-05  2.021e+02  -4.128
## shoot_lag                   -2.181e-03  4.450e-02  5.670e+03  -0.049
## tmax_f                      -9.176e-06  3.281e-05  5.667e+03  -0.280
## snow_in                    -5.841e-04  1.629e-03  5.659e+03  -0.359
## precip_in                   -6.177e-04  5.467e-03  5.659e+03  -0.113
## conc_dis                    -1.562e-03  1.427e-03  1.460e+01  -1.095
## dplyr::lag(white_acute_incid_c, 1) -6.056e-03  1.320e-02  5.669e+03  -0.459
## dplyr::lag(white_acute_incid_c, 2) -5.734e-03  1.320e-02  5.668e+03  -0.434
## dplyr::lag(white_acute_incid_c, 3) -5.343e-03  1.320e-02  5.670e+03  -0.405
##                                     Pr(>|t|)
## (Intercept)                0.352690
## t                          0.608892
## post_floyd1                0.330337
## t_post_floyd               0.950537
## state_of_emerg1            0.393733
## stay_at_home1              0.055578 .
## uof_lag                    0.000139 ***
## stops_lag                   5.35e-05 ***
## shoot_lag                   0.960923
## tmax_f                      0.779704
## snow_in                    0.719911
## precip_in                   0.910045
## conc_dis                    0.291449
## dplyr::lag(white_acute_incid_c, 1) 0.646500
## dplyr::lag(white_acute_incid_c, 2) 0.664097
## dplyr::lag(white_acute_incid_c, 3) 0.685760
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_latin_acute <- lmer(latin_acute_incid_c~t+post_floyd+t_post_floyd+
                      state_of_emerg+stay_at_home+
                      uof_lag+stops_lag+shoot_lag+
                      tmax_f+snow_in+precip_in+
                      conc_dis+
                      dplyr::lag(latin_acute_incid_c, 1)+ dplyr::lag(latin_acute_incid_c, 2)+
                      dplyr::lag(latin_acute_incid_c, 3)+
                      (post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_latin_acute)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## latin_acute_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + dplyr::lag(latin_acute_incid_c,
## 1) + dplyr::lag(latin_acute_incid_c, 2) + dplyr::lag(latin_acute_incid_c,
## 3) + (post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 1919.9
##
## Scaled residuals:
##   Min       1Q   Median       3Q      Max
## -0.113 -0.044 -0.024 -0.002  73.048
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept) 2.063e-05 0.004542
##           post_floyd1 2.327e-05 0.004824 -1.00
##   Residual                8.110e-02 0.284781
## Number of obs: 5516, groups:  zcta, 22
##
## Fixed effects:
##                                     Estimate Std. Error    df t value
## (Intercept)                   -7.087e-03  1.556e-02  2.012e+03  -0.455
## t                             1.098e-04  6.914e-05  5.390e+03   1.589
## post_floyd1                    2.277e-03  3.946e-02  5.226e+03   0.058
## t_post_floyd                  -3.356e-04  1.242e-03  5.483e+03  -0.270
## state_of_emerg1               -1.339e-02  3.742e-02  5.485e+03  -0.358
## stay_at_home1                 -3.345e-03  3.863e-02  5.482e+03  -0.087
## uof_lag                       -5.495e-04  2.199e-03  5.492e+03  -0.250
## stops_lag                     -1.106e-04  5.641e-04  1.559e+02  -0.196
## shoot_lag                     -6.589e-03  2.980e-01  5.500e+03  -0.022
## tmax_f                        9.836e-05  2.232e-04  5.484e+03   0.441
## snow_in                      -1.738e-03  1.099e-02  5.482e+03  -0.158
## precip_in                     -3.120e-02  3.716e-02  5.483e+03  -0.840
## conc_dis                      -5.085e-03  4.141e-03  2.866e+01  -1.228
## dplyr::lag(latin_acute_incid_c, 1) -9.232e-04  1.348e-02  5.500e+03  -0.068
## dplyr::lag(latin_acute_incid_c, 2) -1.023e-03  1.349e-02  5.497e+03  -0.076
## dplyr::lag(latin_acute_incid_c, 3) -1.044e-03  1.348e-02  5.500e+03  -0.077
##                                     Pr(>|t|)
## (Intercept)                        0.649
## t                                  0.112
## post_floyd1                        0.954
## t_post_floyd                       0.787
## state_of_emerg1                    0.720
## stay_at_home1                      0.931
## uof_lag                            0.803
## stops_lag                          0.845
## shoot_lag                          0.982
## tmax_f                             0.659
```

```

## snow_in                                0.874
## precip_in                             0.401
## conc_dis                              0.229
## dplyr::lag(latin_acute_incid_c, 1)    0.945
## dplyr::lag(latin_acute_incid_c, 2)    0.940
## dplyr::lag(latin_acute_incid_c, 3)    0.938
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

#extract random coefficients
re_pf_white_acute <- as.data.frame(coef(re_white_acute)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_white = post_floyd1)

re_pf_blk_acute <- as.data.frame(coef(re_blk_acute)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_blk = post_floyd1)

re_pf_latin_acute <- as.data.frame(coef(re_latin_acute)$zcta) %>%
  select(post_floyd1) %>%
  mutate(zipcode = as.numeric(rownames(.))) %>%
  rename(post_floyd1_latin = post_floyd1)

#aggregate to zip-level over years
zip_level_acute <- panel %>%
  group_by(zcta) %>%
  summarize(mh_all_tot = sum(mh_all_tot, na.rm = T),
            total_pop = sum(total_pop, na.rm = T),
            conc_dis = mean(conc_dis, na.rm = T)) %>%
  mutate(mh_incid_c = (mh_all_tot/total_pop)*1000) %>%
  ungroup() %>%
  left_join(zcta, by = "zcta")

zip_level_acute <- zip_level_acute %>%
  left_join(re_pf_white_acute, by = c("zcta" = "zipcode")) %>%
  left_join(re_pf_blk_acute, by = c("zcta" = "zipcode")) %>%
  left_join(re_pf_latin_acute, by = c("zcta" = "zipcode"))

re_coef_map_white_acute <- ggplot() +
  geom_sf(data = zip_level_acute, aes(geometry = geometry, fill = post_floyd1_white), color = "lightgrey") +
  geom_sf(data = mpls, aes(geometry = geometry), color = "black", alpha = 0) +
  geom_sf(data = gfs, aes(geometry = geometry), color = "black") +
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold") +
  scale_fill_distiller(palette = "Spectral",
                       limits = c(min(zip_level_acute$post_floyd1_white),
                                   max(zip_level_acute$post_floyd1_latin))) +
  labs(title = "Figure 3: RE Coefficients-White Residents",
        subtitle = "Rate per 1,000",
        fill = "Post-Killing Change") +
  theme(axis.text.x = element_blank(),
        axis.text.y = element_blank(),
        axis.line = element_blank(),

```



```

axis.ticks = element_blank(),
panel.border = element_blank(),
panel.grid = element_blank(),
axis.title = element_blank(),
panel.background = element_blank(),
panel.grid.major = element_line(colour="transparent"),
plot.subtitle = element_text(face="italic"),
strip.background = element_rect(fill = "white",
                                colour = "black"))+
ggspatial::annotation_scale()+
ggspatial::annotation_north_arrow(which_north = "true",
                                location = "tr")

re_coef_map_blk_acute <- ggplot() +
  geom_sf(data = zip_level_acute, aes(geometry = geometry, fill = post_floyd1_blk), color = "lightgrey") +
  geom_sf(data = mpl, aes(geometry = geometry), color = "black", alpha = 0)+
  geom_sf(data = gfs, aes(geometry = geometry), color = "black")+
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold")+
  scale_fill_distiller(palette = "Spectral",
                      limits = c(min(zip_level_acute$post_floyd1_white),
                                max(zip_level_acute$post_floyd1_latin)))+
  labs(title = "Figure 4: RE Coefficients-Black Residents",
        subtitle = "Rate per 1,000",
        fill = "Post-Killing Change")+
  theme(axis.text.x = element_blank(),
        axis.text.y = element_blank(),
        axis.line = element_blank(),
        axis.ticks = element_blank(),
        panel.border = element_blank(),
        panel.grid = element_blank(),
        axis.title = element_blank(),
        panel.background = element_blank(),
        panel.grid.major = element_line(colour="transparent"),
        plot.subtitle = element_text(face="italic"),
        strip.background = element_rect(fill = "white",
                                        colour = "black"))+
  ggspatial::annotation_scale()+
  ggspatial::annotation_north_arrow(which_north = "true",
                                    location = "tr")

re_coef_map_latin_acute <- ggplot() +
  geom_sf(data = zip_level_acute, aes(geometry = geometry, fill = post_floyd1_latin), color = "lightgrey") +
  geom_sf(data = mpl, aes(geometry = geometry), color = "black", alpha = 0)+
  geom_sf(data = gfs, aes(geometry = geometry), color = "black")+
  geom_text_repel(data = gfs, aes(x=lon, y=lat, label = name),
                  size = 2,
                  fontface = "bold")+
  scale_fill_distiller(palette = "Spectral",
                      limits = c(min(zip_level_acute$post_floyd1_white),
                                max(zip_level_acute$post_floyd1_latin)))+
  labs(title = "Figure 5: RE Coefficients-Latine Residents",
        subtitle = "Rate per 1,000",
        fill = "Post-Killing Change")+
  theme(axis.text.x = element_blank(),
        axis.text.y = element_blank(),
        axis.line = element_blank(),
        axis.ticks = element_blank(),
        panel.border = element_blank(),
        panel.grid = element_blank(),

```



```

axis.title = element_blank(),
panel.background = element_blank(),
panel.grid.major = element_line(colour="transparent"),
plot.subtitle = element_text(face="italic"),
strip.background = element_rect(fill = "white",
                                colour = "black"))+
ggspatial::annotation_scale()+
ggspatial::annotation_north_arrow(which_north = "true",
                                location = "tr")

#RE random coefficient model - interaction
re_int_acute <- lmer(depress_incid_c~t+post_floyd+t_post_floyd+
                    state_of_emerg+stay_at_home+
                    uof_lag+stops_lag+shoot_lag+
                    tmax_f+snow_in+precip_in+conc_dis+
                    post_floyd:conc_dis+
                    dplyr::lag(depress_incid_c, 1)+ dplyr::lag(depress_incid_c, 2)+
                    dplyr::lag(depress_incid_c, 3)+
                    (1+post_floyd|zcta), data = panel)

```

```

## Warning: Some predictor variables are on very different scales: consider
## rescaling

```

```

## Warning: Some predictor variables are on very different scales: consider
## rescaling

```

```
summary(re_int_acute)
```

```

## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula: depress_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##      stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##      snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(depress_incid_c,
##      1) + dplyr::lag(depress_incid_c, 2) + dplyr::lag(depress_incid_c,
##      3) + (1 + post_floyd | zcta)
##      Data: panel
##
## REML criterion at convergence: 14183.6
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -6.1963 -0.1897 -0.0260  0.1564 13.3722
##
## Random effects:
##      Groups   Name                Variance Std.Dev. Corr
##      zcta     (Intercept) 1.1265     1.0614
##      post_floyd1 0.2104     0.4587    -1.00
##      Residual      0.6726     0.8201
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)   9.029e-01 2.315e-01 2.101e+01   3.900
## t             -9.307e-05 1.995e-04 5.293e+03  -0.467
## post_floyd1    4.998e-02 1.499e-01 8.591e+01   0.333
## t_post_floyd  -1.451e-02 3.585e-03 5.683e+03  -4.047
## state_of_emerg1 -6.733e-02 1.077e-01 5.682e+03  -0.625
## stay_at_home1  -1.575e-01 1.113e-01 5.681e+03  -1.416
## uof_lag        3.112e-03 4.435e-03 5.676e+03   0.702
## stops_lag      3.847e-03 2.117e-03 5.503e+03   1.817
## shoot_lag      -4.723e-02 8.575e-01 5.681e+03  -0.055

```

```
## tmax_f      8.347e-05  6.319e-04  5.681e+03  0.132
## snow_in     3.081e-02  3.137e-02  5.681e+03  0.982
## precip_in   -7.265e-02  1.053e-01  5.681e+03 -0.690
## conc_dis    3.346e-01  1.253e-01  2.483e+02  2.671
## dplyr::lag(depress_incid_c, 1) -3.595e-03  1.323e-02  5.703e+03 -0.272
## dplyr::lag(depress_incid_c, 2)  2.015e-03  1.324e-02  5.703e+03  0.152
## dplyr::lag(depress_incid_c, 3)  1.017e-04  1.323e-02  5.703e+03  0.008
## post_floyd1:conc_dis -1.620e-01  6.631e-02  1.190e+02 -2.443
## Pr(>|t|)
## (Intercept) 0.000825 ***
## t           0.640813
## post_floyd1 0.739647
## t_post_floyd 5.26e-05 ***
## state_of_emerg1 0.531943
## stay_at_home1 0.156946
## uof_lag      0.482989
## stops_lag    0.069256 .
## shoot_lag    0.956076
## tmax_f       0.894923
## snow_in      0.326156
## precip_in    0.490310
## conc_dis     0.008056 **
## dplyr::lag(depress_incid_c, 1) 0.785869
## dplyr::lag(depress_incid_c, 2) 0.879023
## dplyr::lag(depress_incid_c, 3) 0.993872
## post_floyd1:conc_dis 0.016035 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

```
re_int_blk_acute <- lmer(black_acute_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+conc_dis+
  post_floyd:conc_dis+
  dplyr::lag(black_acute_incid_c, 1)+ dplyr::lag(black_acute_incid_c, 2)+
  dplyr::lag(black_acute_incid_c, 3)+
  (1+post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_int_blk_acute)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## black_acute_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(black_acute_incid_c,
##   1) + dplyr::lag(black_acute_incid_c, 2) + dplyr::lag(black_acute_incid_c,
##   3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: -16122
##
## Scaled residuals:
```

```
##      Min      1Q Median      3Q      Max
## -0.639 -0.093 -0.047 -0.007 46.335
##
## Random effects:
## Groups      Name              Variance Std.Dev. Corr
## zcta        (Intercept) 6.629e-06 0.002575
##              post_floyd1 3.685e-05 0.006070 1.00
## Residual              3.382e-03 0.058151
## Number of obs: 5720, groups: zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept)    -3.396e-04  3.121e-03  1.961e+03  -0.109
## t                4.027e-05  1.363e-05  5.690e+03   2.956
## post_floyd1     -1.838e-02  8.165e-03  2.156e+03  -2.251
## t_post_floyd      1.586e-04  2.531e-04  5.684e+03   0.627
## state_of_emerg1    1.547e-02  7.643e-03  5.684e+03   2.024
## stay_at_home1     -2.064e-02  7.898e-03  5.684e+03  -2.613
## uof_lag           8.302e-06  2.688e-04  1.880e+03   0.031
## stops_lag        -6.373e-05  9.911e-05  3.321e+02  -0.643
## shoot_lag        -5.112e-04  6.073e-02  5.695e+03  -0.008
## tmax_f           -2.002e-05  4.478e-05  5.685e+03  -0.447
## snow_in          -1.459e-03  2.224e-03  5.683e+03  -0.656
## precip_in         2.655e-03  7.466e-03  5.683e+03   0.356
## conc_dis         -7.560e-04  1.048e-03  3.125e+01  -0.721
## dplyr::lag(black_acute_incid_c, 1) 3.912e-03  1.326e-02  5.700e+03   0.295
## dplyr::lag(black_acute_incid_c, 2) -5.334e-03  1.324e-02  5.703e+03  -0.403
## dplyr::lag(black_acute_incid_c, 3) 1.155e-02  1.324e-02  5.703e+03   0.873
## post_floyd1:conc_dis 2.085e-03  2.685e-03  3.966e+01   0.776
##
##              Pr(>|t|)
## (Intercept)    0.91335
## t              0.00313 **
## post_floyd1    0.02451 *
## t_post_floyd   0.53099
## state_of_emerg1 0.04305 *
## stay_at_home1  0.00900 **
## uof_lag        0.97536
## stops_lag      0.52067
## shoot_lag      0.99328
## tmax_f         0.65485
## snow_in        0.51177
## precip_in      0.72214
## conc_dis       0.47617
## dplyr::lag(black_acute_incid_c, 1) 0.76792
## dplyr::lag(black_acute_incid_c, 2) 0.68707
## dplyr::lag(black_acute_incid_c, 3) 0.38284
## post_floyd1:conc_dis 0.44212
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_int_white_acute <- lmer(white_acute_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+conc_dis+
  post_floyd:conc_dis+
  dplyr::lag(white_acute_incid_c, 1)+ dplyr::lag(white_acute_incid_c, 2)+
  dplyr::lag(white_acute_incid_c, 3)+
  (1+post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_int_white_acute)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## white_acute_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(white_acute_incid_c,
##   1) + dplyr::lag(white_acute_incid_c, 2) + dplyr::lag(white_acute_incid_c,
##   3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: -19649.9
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -1.065 -0.027 -0.010  0.002  72.956
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept) 6.421e-05 0.008013
##           post_floyd1 2.823e-05 0.005313 -1.00
##   Residual                1.813e-03 0.042582
## Number of obs: 5720, groups:  zcta, 22
##
## Fixed effects:
##               Estimate Std. Error      df t value
## (Intercept)    2.681e-03  2.830e-03 5.265e+01  0.947
## t              4.989e-06  9.999e-06 5.647e+03  0.499
## post_floyd1    -5.812e-03  6.005e-03 1.765e+03 -0.968
## t_post_floyd   -1.072e-05  1.853e-04 5.661e+03 -0.058
## state_of_emerg1 4.741e-03  5.592e-03 5.662e+03  0.848
## stay_at_home1  1.106e-02  5.779e-03 5.660e+03  1.913
## uof_lag        -8.385e-04  2.157e-04 9.250e+02 -3.888
## stops_lag      -4.101e-04  9.661e-05 2.105e+02 -4.245
## shoot_lag      -2.002e-03  4.450e-02 5.670e+03 -0.045
## tmax_f         -8.985e-06  3.280e-05 5.666e+03 -0.274
## snow_in        -5.846e-04  1.629e-03 5.659e+03 -0.359
## precip_in      -6.056e-04  5.467e-03 5.660e+03 -0.111
## conc_dis       -2.172e-03  1.865e-03 1.015e+01 -1.164
## dplyr::lag(white_acute_incid_c, 1) -6.077e-03  1.320e-02 5.668e+03 -0.460
## dplyr::lag(white_acute_incid_c, 2) -5.707e-03  1.320e-02 5.667e+03 -0.432
## dplyr::lag(white_acute_incid_c, 3) -5.299e-03  1.320e-02 5.670e+03 -0.401
## post_floyd1:conc_dis 1.049e-03  2.098e-03 3.421e+01  0.500
##               Pr(>|t|)
## (Intercept)    0.347888
## t              0.617818
## post_floyd1    0.333287
## t_post_floyd   0.953885
## state_of_emerg1 0.396563
## stay_at_home1  0.055750 .
## uof_lag        0.000108 ***
## stops_lag      3.28e-05 ***
## shoot_lag      0.964128
```

```
## tmax_f 0.784161
## snow_in 0.719664
## precip_in 0.911792
## conc_dis 0.270957
## dplyr::lag(white_acute_incid_c, 1) 0.645388
## dplyr::lag(white_acute_incid_c, 2) 0.665621
## dplyr::lag(white_acute_incid_c, 3) 0.688228
## post_floyd1:conc_dis 0.620341
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')

re_int_latin_acute <- lmer(latin_acute_incid_c~t+post_floyd+t_post_floyd+
  state_of_emerg+stay_at_home+
  uof_lag+stops_lag+shoot_lag+
  tmax_f+snow_in+precip_in+conc_dis+
  post_floyd:conc_dis+
  dplyr::lag(latin_acute_incid_c, 1)+ dplyr::lag(latin_acute_incid_c, 2)+
  dplyr::lag(latin_acute_incid_c, 3)+
  (1+post_floyd|zcta), data = panel)
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
## Warning: Some predictor variables are on very different scales: consider
## rescaling
```

```
summary(re_int_latin_acute)
```

```
## Linear mixed model fit by REML. t-tests use Satterthwaite's method [
## lmerModLmerTest]
## Formula:
## latin_acute_incid_c ~ t + post_floyd + t_post_floyd + state_of_emerg +
##   stay_at_home + uof_lag + stops_lag + shoot_lag + tmax_f +
##   snow_in + precip_in + conc_dis + post_floyd:conc_dis + dplyr::lag(latin_acute_incid_c,
##   1) + dplyr::lag(latin_acute_incid_c, 2) + dplyr::lag(latin_acute_incid_c,
##   3) + (1 + post_floyd | zcta)
## Data: panel
##
## REML criterion at convergence: 1926.9
##
## Scaled residuals:
##   Min      1Q  Median      3Q      Max
## -0.116 -0.044 -0.024 -0.002  73.039
##
## Random effects:
##   Groups   Name                Variance Std.Dev. Corr
##   zcta     (Intercept) 2.324e-05 0.004821
##           post_floyd1 2.880e-05 0.005366 -1.00
## Residual              8.111e-02 0.284802
## Number of obs: 5516, groups:  zcta, 22
##
## Fixed effects:
##
##              Estimate Std. Error      df t value
## (Intercept) -7.058e-03  1.557e-02  1.979e+03  -0.453
## t            1.097e-04  6.915e-05  5.386e+03   1.587
## post_floyd1  2.427e-03  3.948e-02  5.146e+03   0.061
## t_post_floyd -3.354e-04  1.242e-03  5.482e+03  -0.270
## state_of_emerg1 -1.342e-02  3.742e-02  5.484e+03  -0.359
## stay_at_home1 -3.332e-03  3.863e-02  5.481e+03  -0.086
```

```
## uof_lag -5.308e-04 2.201e-03 5.491e+03 -0.241
## stops_lag -1.173e-04 5.656e-04 1.518e+02 -0.207
## shoot_lag -5.921e-03 2.981e-01 5.498e+03 -0.020
## tmax_f 9.838e-05 2.232e-04 5.483e+03 0.441
## snow_in -1.740e-03 1.099e-02 5.481e+03 -0.158
## precip_in -3.120e-02 3.717e-02 5.482e+03 -0.839
## conc_dis -5.517e-03 4.489e-03 2.047e+01 -1.229
## dplyr::lag(latin_acute_incid_c, 1) -9.836e-04 1.349e-02 5.499e+03 -0.073
## dplyr::lag(latin_acute_incid_c, 2) -1.058e-03 1.349e-02 5.496e+03 -0.078
## dplyr::lag(latin_acute_incid_c, 3) -1.041e-03 1.348e-02 5.499e+03 -0.077
## post_floyd1:conc_dis 2.988e-03 1.167e-02 3.858e+02 0.256
## Pr(>|t|)
## (Intercept) 0.650
## t 0.113
## post_floyd1 0.951
## t_post_floyd 0.787
## state_of_emerg1 0.720
## stay_at_home1 0.931
## uof_lag 0.809
## stops_lag 0.836
## shoot_lag 0.984
## tmax_f 0.659
## snow_in 0.874
## precip_in 0.401
## conc_dis 0.233
## dplyr::lag(latin_acute_incid_c, 1) 0.942
## dplyr::lag(latin_acute_incid_c, 2) 0.938
## dplyr::lag(latin_acute_incid_c, 3) 0.938
## post_floyd1:conc_dis 0.798
## fit warnings:
## Some predictor variables are on very different scales: consider rescaling
## optimizer (nloptwrap) convergence code: 0 (OK)
## boundary (singular) fit: see help('isSingular')
```

*#specifying varcov objects from model estimates*

```
var_re_white_acute <- VarCorr(re_white_acute)
var_re_int_white_acute <- VarCorr(re_int_white_acute)
var_re_black_acute <- VarCorr(re_blk_acute)
var_re_int_black_acute <- VarCorr(re_int_blk_acute)
var_re_latin_acute <- VarCorr(re_latin_acute)
var_re_int_latin_acute <- VarCorr(re_int_latin_acute)
class(re_white_acute) <- "lmerMod"
class(re_blk_acute) <- "lmerMod"
class(re_latin_acute) <- "lmerMod"
class(re_int_blk_acute) <- "lmerMod"
class(re_int_white_acute) <- "lmerMod"
class(re_int_blk_acute) <- "lmerMod"
class(re_int_latin_acute) <- "lmerMod"

(re_coef_map_white_acute+re_coef_map_blk_acute)/(re_coef_map_latin_acute+cd_map)
```

Figure 3: RE Coefficients–White F  
Rate per 1,000

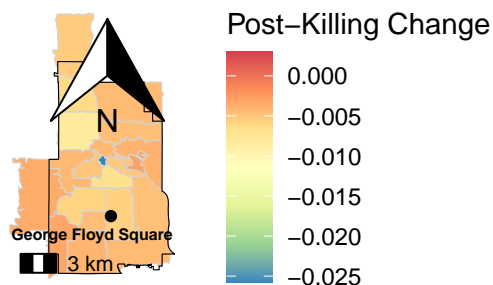


Figure 4: RE Coefficients–Black Reside  
Rate per 1,000

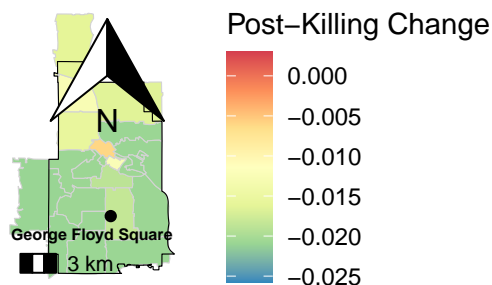


Figure 5: RE Coefficients–Latine I  
Rate per 1,000

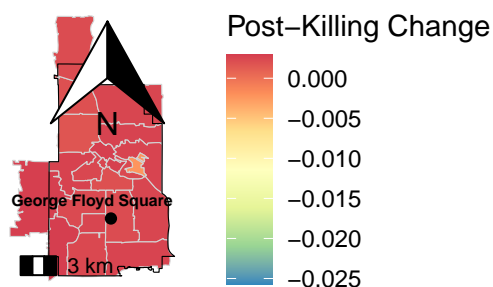
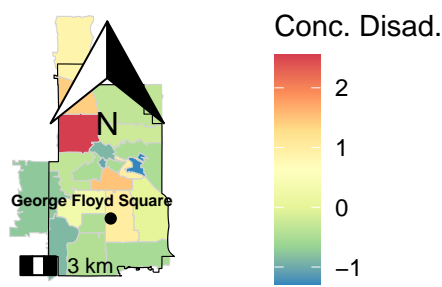


Figure 6: Concentrated Disadvantage  
Standard Deviation Units



```
stargazer(re_white, re_blk, re_latin, re_int_white, re_int_blk, re_int_latin,
  title = "Interrupted Time Series RE Models of Mental Health Diagnoses, Minneapolis 2016-2020",
  covariate.labels = c("T",
    "Post-Killing", "T Post-Killing",
    "COVID - State of Emerg.", "COVID - Stay at Home",
    "MPD Use of Force t-1", "MPD Stops t-1",
    "MPD OIS t-1",
    "Mean Max. Temp.", "Snow (in.)", "Precip. (in.)",
    "Conc. Disad.",
    "AR(1)-White", "AR(2)-White", "AR(3)-White",
    "AR(1)-Black", "AR(2)-Black", "AR(3)-Black",
    "AR(1)-Latine", "AR(2)-Latine", "AR(3)-Latine",
    "Post-KillingXConc.Disad."),
  dep.var.caption = "Mental Health Diagnoses/1,000",
  dep.var.labels.include = FALSE,
  column.labels = c("White", "Black", "Latine",
    "White w/ Int.", "Black w/ Int.", "Latine w/ Int."),
  model.numbers = TRUE,
  single.row = FALSE,
  align = T,
  omit.stat = "adj.rsq",
  font.size="footnotesize",
  no.space = T,
  column.sep.width = "1pt",
  #star.cutoffs = c(.05, .01, .001), star.char = c("","**","***"),
  report = "vcs",
  ci=TRUE,
  ci.level=0.95,
  ci.separator = "|",
  notes = "95\\% Confidence Intervals in parentheses",
  header = F,
  notes.append = F,
  add.lines = list(c("Resid. Var.", round(attr(VarCorr(re_white), "sc")^2,2),
```

```

round(attr(VarCorr(re_int_white), "sc")^2,2),
round(attr(VarCorr(re_blk), "sc")^2,2),
round(attr(VarCorr(re_int_blk), "sc")^2,2),
  round(attr(VarCorr(re_latin), "sc")^2,2),
round(attr(VarCorr(re_int_latin), "sc")^2,2)),
  c("ZCTA Var.",
    round(var_re_white$zcta[1,1],2),
    round(var_re_int_white$zcta[1,1],2),
    round(var_re_black$zcta[1,1],2),
    round(var_re_int_black$zcta[1,1],2),
    round(var_re_latin$zcta[1,1],2),
    round(var_re_int_latin$zcta[1,1],2)),
  c("Post-Floyd Var.",
    round(var_re_white$zcta[2,2],2),
    round(var_re_int_white$zcta[2,2],2),
    round(var_re_black$zcta[2,2],2),
    round(var_re_int_black$zcta[2,2],2),
    round(var_re_latin$zcta[2,2],2),
    round(var_re_int_latin$zcta[2,2],2))))

```

## Appendix Tables

```

panel_long <- panel %>%
  ungroup() %>%
  select(Schizophrenia_tot, Depress_tot,
    bipolar_tot, othermood_tot,
    anxiety_tot, OCD_tot,
    trauma_tot, impulse_tot,
    personality_tot, eating_tot,
    somatic_tot, suicidal_tot,
    misc_tot, neuro_tot, etoh_tot,
    opioid_tot, weed_tot,
    sedative_tot, stimulant_tot,
    halluc_tot, inhal_tot,
    tobacco_tot, othersub_tot,
    disord_rem_tot, mh_all_tot) %>%
  pivot_longer(everything(), names_to = "type", values_to = "count") %>%
  mutate(Diagnosis = case_when(
    type=="Schizophrenia_tot"~"Schizophrenia",
    type=="Depress_tot"~"Depression",
    type=="bipolar_tot"~"Bipolar Disorder",
    type=="othermood_tot"~"Other Mood Disorder",
    type=="anxiety_tot"~"Anxiety Disorders",
    type=="OCD_tot"~"Obsessive Compulsive Disorder (OCD)",
    type=="trauma_tot"~"Trauma Disorders",
    type=="impulse_tot"~"Impulse Control Disorders (ICD)",
    type=="personality_tot"~"Personality Disorders",
    type=="eating_tot"~"Eating Disorders",
    type=="somatic_tot"~"Somatic Symptom Disorder",
    type=="suicidal_tot"~"Suicidal Ideation",
    type=="misc_tot"~"Miscellaneous",
    type=="neuro_tot"~"Neurological Disorders",
    type=="etoh_tot"~"Substance Use Disorder",
    type=="opioid_tot"~"Substance Use Disorder",
    type=="weed_tot"~"Substance Use Disorder",
    type=="sedative_tot"~"Substance Use Disorder",
    type=="stimulant_tot"~"Substance Use Disorder",
    type=="halluc_tot"~"Substance Use Disorder",
    type=="inhal_tot"~"Substance Use Disorder",

```



Table 2: Interrupted Time Series RE Models of Mental Health Diagnoses, Minneapolis 2016-2020

	Mental Health Diagnoses/1,000					
	White	Black	Latine	White w/ Int.	Black w/ Int.	Latine w/ Int.
	(1)	(2)	(3)	(4)	(5)	(6)
T	0.003 (0.003 0.003)	0.007 (0.005 0.008)	0.007 (0.003 0.011)	0.003 (0.002 0.003)	0.007 (0.005 0.008)	0.007 (0.003 0.011)
Post-Killing	-0.131 (-0.379 0.118)	2.529 (1.492 3.566)	-0.219 (-2.702 2.263)	-0.117 (-0.381 0.148)	2.530 (1.490 3.569)	-0.211 (-2.695 2.273)
T Post-Killing	-0.014 (-0.021 -0.006)	-0.073 (-0.106 -0.041)	0.015 (-0.063 0.093)	-0.013 (-0.021 -0.006)	-0.073 (-0.106 -0.041)	0.015 (-0.063 0.093)
COVID - State of Emerg.	-0.101 (-0.320 0.117)	-2.241 (-3.207 -1.274)	-0.994 (-3.345 1.356)	-0.108 (-0.327 0.110)	-2.242 (-3.209 -1.275)	-1.004 (-3.354 1.347)
COVID - Stay at Home	-0.162 (-0.387 0.064)	1.972 (0.973 2.971)	0.466 (-1.959 2.891)	-0.161 (-0.386 0.064)	1.972 (0.973 2.971)	0.467 (-1.958 2.892)
MPD Use of Force t-1	-0.029 (-0.038 -0.020)	-0.063 (-0.102 -0.024)	0.513 (0.373 0.654)	-0.029 (-0.038 -0.020)	-0.063 (-0.102 -0.024)	0.514 (0.373 0.655)
MPD Stops t-1	0.010 (0.005 0.014)	0.015 (-0.003 0.033)	-0.067 (-0.120 -0.014)	0.007 (0.003 0.012)	0.015 (-0.003 0.033)	-0.072 (-0.126 -0.017)
MPD OIS t-1	-0.666 (-2.406 1.074)	-1.809 (-9.537 5.919)	-4.344 (-23.090 14.402)	-0.631 (-2.367 1.105)	-1.804 (-9.532 5.925)	-4.309 (-23.055 14.436)
Mean Max. Temp.	0.001 (0.0001 0.003)	-0.001 (-0.007 0.005)	-0.006 (-0.020 0.008)	0.001 (0.0001 0.003)	-0.001 (-0.007 0.005)	-0.006 (-0.020 0.008)
Snow (in.)	0.023 (-0.040 0.087)	-0.078 (-0.359 0.204)	-0.453 (-1.143 0.237)	0.023 (-0.040 0.087)	-0.078 (-0.359 0.204)	-0.454 (-1.144 0.236)
Precip. (in.)	-0.075 (-0.288 0.139)	-0.437 (-1.383 0.509)	5.901 (3.551 8.251)	-0.070 (-0.283 0.143)	-0.436 (-1.382 0.509)	5.905 (3.555 8.254)
Conc. Disad.	-0.293 (-0.487 -0.098)	-0.708 (-1.122 -0.293)	-0.630 (-1.388 0.127)	-0.657 (-0.898 -0.416)	-0.746 (-1.270 -0.221)	-0.760 (-1.589 0.069)
AR(1)-White	0.002 (-0.024 0.027)			0.002 (-0.024 0.027)		
AR(2)-White	0.035 (0.010 0.061)			0.037 (0.011 0.062)		
AR(3)-White	0.002 (-0.024 0.027)			0.0002 (-0.025 0.026)		
AR(1)-Black		-0.009 (-0.035 0.017)			-0.009 (-0.035 0.017)	
AR(2)-Black		0.022 (-0.004 0.048)			0.022 (-0.004 0.048)	
AR(3)-Black		0.005 (-0.020 0.031)			0.006 (-0.020 0.031)	
AR(1)-Latine			-0.003 (-0.030 0.023)			-0.003 (-0.030 0.023)
AR(2)-Latine			-0.011 (-0.037 0.015)			-0.011 (-0.037 0.015)
AR(3)-Latine			-0.007 (-0.033 0.020)			-0.007 (-0.033 0.020)
Post-KillingXConc.Disad.				0.340 (0.231 0.448)	0.039 (-0.324 0.402)	0.301 (-0.458 1.060)
Constant	0.300 (-0.032 0.631)	0.565 (-0.087 1.217)	0.200 (-1.038 1.437)	0.323 (-0.093 0.739)	0.568 (-0.092 1.229)	0.219 (-1.033 1.470)
Resid. Var.	0.72	0.72	14.12	14.12	83.22	83.21
ZCTA Var.	0.58	0.94	1.56	1.62	3.19	3.39
Post-Floyd Var.	0.05	0.1	0.19	0.22	0.13	0.17
Observations	5,720	5,720	5,516	5,720	5,720	5,516
Log Likelihood	-7,287.256	-15,748.440	-20,059.630	-7,273.912	-15,749.200	-20,059.370
Akaike Inf. Crit.	14,614.510	31,536.880	40,159.260	14,589.820	31,540.400	40,160.750
Bayesian Inf. Crit.	14,747.550	31,669.920	40,291.570	14,729.510	31,680.090	40,299.670

Note:

95% Confidence Intervals in parentheses

Table A1: Diagnosis Distribution of Aggregated Mental Health Measure, Minneapolis 2016-2020

Diagnosis	Frequency	Percentage
Total Mental Health Diagnoses	257993	
Substance Use Disorder	158229	33.81
Depression	78316	16.73
Anxiety Disorders	73869	15.78
Schizophrenia	32093	6.86
Trauma Disorders	25573	5.46
Suicidal Ideation	24962	5.33
Bipolar Disorder	20588	4.4
Neurological Disorders	14170	3.03
Personality Disorders	13534	2.89
Disordered REM Sleep Disorder	8294	1.77
Other Mood Disorder	7530	1.61
Miscellaneous	3563	0.76
Impulse Control Disorders (ICD)	2875	0.61
Obsessive Compulsive Disorder (OCD)	1765	0.38
Eating Disorders	1600	0.34
Somatic Symptom Disorder	1056	0.23

```

type=="tobacco_tot"~"Substance Use Disorder",
type=="othersub_tot"~"Substance Use Disorder",
type=="disord_rem_tot"~"Disordered REM Sleep Disorder",
type=="mh_all_tot"~"Total Mental Health Diagnoses"
)) %>%
group_by(Diagnosis) %>%
summarize(Frequency = sum(count, na.rm = T)) %>%
arrange(desc(Frequency)) %>%
ungroup() %>%
mutate(total = sum(Frequency[-1]),
       Percentage = round(Frequency/total*100,2)) %>%
select(-total) %>%
mutate(Percentage = ifelse(row_number()==1, "", Percentage))

library(kableExtra)

##
## Attaching package: 'kableExtra'

## The following object is masked from 'package:dplyr':
##
##   group_rows

panel_long %>%
  kbl(caption="Diagnosis Distribution of Aggregated Mental Health Measure, Minneapolis 2016-2020",
      format= "latex", booktabs = T,
      align=c("l", "r", "r")) %>%
  kable_classic(full_width = F, html_font = "times new roman")

results_table<-standardizedSolution(cfa_cd) %>%
  filter(row_number() %in% c(1:6)) %>%
  dplyr::select(LHS=lhs, Specification=op, RHS=rhs, 'Std(Beta)'=est.std, SE=se,
               'P-Value'=pvalue) %>%
  mutate(LHS = case_when(
    LHS=="cd"~"Conc. Dis.",
    LHS=="unemp_rate"~"Unemp. Rate"),
    RHS = case_when(

```

```

    RHS=="unemp_rate"~"Unemp. Rate",
    RHS=="pov_rate"~"Poverty Rate",
    RHS=="female_hh_rate"~"Female-HH Rate",
    RHS=="no_hs_dip_rate"~"No HS Diploma Rate",
    RHS=="black_pop"~"Black Pop"
  ),
  Specification = case_when(
    Specification=="~"~"FL",
    Specification=="~"~"Cov."),
  `P-Value` = round(`P-Value`, 2))

stargazer(results_table, summary = FALSE, header = F,
  type="latex", style="aer", align = T,
  title="CFA Measurement Model of Concentrated Disadvantage",
  notes="$LR\chi^2$ vs. saturated (4) = 1186, p < .05, CFI = .926, SRMR = .049")

```

Table A2: CFA Measurement Model of Concentrated Disadvantage

	LHS	Specification	RHS	Std(Beta)	SE	P-Value
1	Conc. Dis.	FL	Unemp. Rate	0.444	0.012	0
2	Conc. Dis.	FL	Poverty Rate	0.520	0.010	0
3	Conc. Dis.	FL	Female-HH Rate	0.866	0.004	0
4	Conc. Dis.	FL	No HS Diploma Rate	0.822	0.005	0
5	Conc. Dis.	FL	Black Pop	0.930	0.004	0
6	Unemp. Rate	Cov.	Black Pop	0.080	0.020	0

$LR\chi^2$  vs. saturated (4) = 1186, p < .05, CFI = .926, SRMR = .049

```

tsdm1 <- ts_ar3_depress
tsdm2 <- ts_ar3_white_depress
tsdm3 <- ts_ar3_black_depress
tsdm4 <- ts_ar3_latin_depress

stargazer(tsdm1,tsdm2,tsdm3,tsdm4,
  title = "Interrupted Time Series Models of Depression Diagnoses, Minneapolis 2016-2020",
  covariate.labels = c("T",
    "Post-Killing", "T Post-Killing",
    "COVID - State of Emerg.", "COVID - Stay at Home",
    "MPD Use of Force t-1", "MPD Stops t-1",
    "MPD OIS t-1",
    "Mean Max. Temp.", "Snow (in.)", "Precip. (in.)",
    "AR(1) Overall", "AR(2) Overall", "AR(3) Overall",
    "AR(1) White", "AR(2) White", "AR(3) White",
    "AR(1) Black", "AR(2) Black", "AR(3) Black",
    "AR(1) Latine", "AR(2) Latine", "AR(3) Latine"),
  dep.var.caption = "Depression Diagnoses/1,000",
  dep.var.labels.include = FALSE,
  column.labels = c("Overall", "White", "Black", "Latine"),
  model.numbers = TRUE,
  single.row = FALSE,
  align = T,
  omit.stat = c("adj.rsq", "f"),
  font.size="footnotesize", no.space = T, column.sep.width = "1pt",
  #star.cutoffs = c(.05, .01, .001), star.char = c("","**","***"),
  report = "vcs",
  ci=TRUE,
  ci.level=0.95,
  ci.separator = "|",

```

```

notes = "95\\% Confidence Intervals in parentheses",
header = F,
notes.append = F)

```

Table A3: Interrupted Time Series Models of Depression Diagnoses, Minneapolis 2016-2020

	Depression Diagnoses/1,000			
	Overall	White	Black	Latine
	(1)	(2)	(3)	(4)
T	-0.0001 (-0.0003 0.0001)	0.0002 (0.00002 0.0004)	0.001 (0.0004 0.001)	0.001 (0.001 0.001)
Post-Killing	0.077 (0.009 0.145)	0.045 (-0.004 0.094)	0.078 (-0.013 0.168)	-0.007 (-0.101 0.086)
T Post-Killing	-0.003 (-0.005 -0.001)	-0.002 (-0.004 -0.0002)	-0.003 (-0.007 -0.0002)	0.0002 (-0.003 0.003)
COVID - State of Emerg.	-0.092 (-0.157 -0.027)	-0.044 (-0.091 0.002)	-0.124 (-0.209 -0.038)	-0.057 (-0.144 0.029)
COVID - Stay at Home	0.028 (-0.037 0.094)	0.008 (-0.039 0.055)	0.043 (-0.043 0.130)	0.0001 (-0.088 0.089)
MPD Use of Force t-1	0.135 (-0.016 0.286)	0.082 (-0.028 0.191)	0.109 (-0.091 0.310)	-0.137 (-0.343 0.070)
MPD Stops t-1	-0.009 (-0.034 0.016)	0.005 (-0.013 0.024)	0.027 (-0.006 0.060)	0.038 (0.004 0.073)
MPD OIS t-1	-2.897 (-7.222 1.429)	-3.774 (-6.929 -0.618)	5.512 (-0.334 11.359)	-2.365 (-8.328 3.599)
Mean Max. Temp.	0.0005 (0.00001 0.001)	0.0002 (-0.0002 0.0005)	0.0002 (-0.0004 0.001)	-0.00004 (-0.001 0.001)
Snow (in.)	0.015 (-0.004 0.033)	0.001 (-0.012 0.015)	0.006 (-0.019 0.031)	-0.006 (-0.032 0.020)
Precip. (in.)	-0.084 (-0.150 -0.017)	-0.028 (-0.075 0.020)	-0.080 (-0.169 0.009)	0.009 (-0.083 0.100)
AR(1) Overall	0.309 (0.173 0.445)			
AR(2) Overall	0.302 (0.165 0.438)			
AR(3) Overall	0.112 (-0.025 0.249)			
AR(1) White		0.228 (0.089 0.367)		
AR(2) White		0.348 (0.213 0.482)		
AR(3) White		0.066 (-0.076 0.207)		
AR(1) Black			0.333 (0.202 0.463)	
AR(2) Black			-0.078 (-0.216 0.060)	
AR(3) Black			0.298 (0.169 0.428)	
AR(1) Latine				0.077 (-0.061 0.215)
AR(2) Latine				-0.023 (-0.161 0.115)
AR(3) Latine				-0.015 (-0.153 0.123)
Constant	0.188 (0.066 0.309)	0.050 (0.0002 0.100)	-0.011 (-0.099 0.076)	-0.012 (-0.100 0.076)
Observations	216	216	216	216
R <sup>2</sup>	0.732	0.511	0.600	0.237
Residual Std. Error (df = 201)	0.051	0.037	0.068	0.070

Note:

95% Confidence Intervals in parentheses

```

tsa1 <- ts_ar3_anxiety
tsa2 <- ts_ar3_white_anxiety
tsa3 <- ts_ar3_black_anxiety
tsa4 <- ts_ar3_latin_anxiety

stargazer(tsa1,tsa2,tsa3,tsa4,
  title = "Interrupted Time Series Models of Anxiety Diagnoses, Minneapolis 2016-2020",
  covariate.labels = c("T",

```

```

        "Post-Killing", "T Post-Killing",
        "COVID - State of Emerg.", "COVID - Stay at Home",
        "MPD Use of Force t-1", "MPD Stops t-1",
        "MPD OIS t-1",
        "Mean Max. Temp.", "Snow (in.)", "Precip. (in.)",
        "AR(1) Overall", "AR(2) Overall", "AR(3) Overall",
        "AR(1) White", "AR(2) White", "AR(3) White",
        "AR(1) Black", "AR(2) Black", "AR(3) Black",
        "AR(1) Latine", "AR(2) Latine", "AR(3) Latine"),
dep.var.caption = "Anxiety Diagnoses/1,000",
dep.var.labels.include = FALSE,
column.labels = c("Overall", "White", "Black", "Latine"),
model.numbers = TRUE,
single.row = FALSE,
align = T,
omit.stat = c("adj.rsq", "f"),
font.size="footnotesize", no.space = T, column.sep.width = "1pt",
#star.cutoffs = c(.05, .01, .001), star.char = c("*", "**", "***"),
report = "vcs",
ci=TRUE,
ci.level=0.95,
ci.separator = "|",
notes = "95\\% Confidence Intervals in parentheses",
header = F,
notes.append = F)

```

```

tsa1 <- ts_ar3_alcohol
tsa2 <- ts_ar3_white_alcohol
tsa3 <- ts_ar3_black_alcohol
tsa4 <- ts_ar3_latine_alcohol

```

```

stargazer(tsa1,tsa2,tsa3,tsa4,
  title = "Interrupted Time Series Models of Alcohol Diagnoses, Minneapolis 2016-2020",
  covariate.labels = c("T",
    "Post-Killing", "T Post-Killing",
    "COVID - State of Emerg.", "COVID - Stay at Home",
    "MPD Use of Force t-1", "MPD Stops t-1",
    "MPD OIS t-1",
    "Mean Max. Temp.", "Snow (in.)", "Precip. (in.)",
    "AR(1) Overall", "AR(2) Overall", "AR(3) Overall",
    "AR(1) White", "AR(2) White", "AR(3) White",
    "AR(1) Black", "AR(2) Black", "AR(3) Black",
    "AR(1) Latine", "AR(2) Latine", "AR(3) Latine"),
  dep.var.caption = "Alcohol Diagnoses/1,000",
  dep.var.labels.include = FALSE,
  column.labels = c("Overall", "White", "Black", "Latine"),
  model.numbers = TRUE,
  single.row = FALSE,
  align = T,
  omit.stat = c("adj.rsq", "f"),
  font.size="footnotesize", no.space = T, column.sep.width = "1pt",
  #star.cutoffs = c(.05, .01, .001), star.char = c("*", "**", "***"),
  report = "vcs",
  ci=TRUE,
  ci.level=0.95,
  ci.separator = "|",
  notes = "95\\% Confidence Intervals in parentheses",
  header = F,
  notes.append = F)

```

Table A4: Interrupted Time Series Models of Anxiety Diagnoses, Minneapolis 2016-2020

	Anxiety Diagnoses/1,000			
	Overall	White	Black	Latine
	(1)	(2)	(3)	(4)
T	0.0001 (-0.0001 0.0002)	0.0002 (0.00002 0.0004)	0.001 (0.0004 0.001)	0.001 (0.0003 0.001)
Post-Killing	0.071 (0.007 0.136)	0.045 (-0.004 0.094)	-0.010 (-0.091 0.071)	0.056 (-0.037 0.149)
T Post-Killing	-0.003 (-0.006 -0.001)	-0.002 (-0.004 -0.0002)	-0.003 (-0.006 -0.0001)	-0.003 (-0.006 0.0004)
COVID - State of Emerg.	-0.066 (-0.128 -0.004)	-0.044 (-0.091 0.002)	-0.025 (-0.101 0.051)	-0.034 (-0.120 0.052)
COVID - Stay at Home	0.032 (-0.030 0.094)	0.008 (-0.039 0.055)	-0.038 (-0.115 0.039)	0.023 (-0.066 0.112)
MPD Use of Force t-1	0.100 (-0.043 0.244)	0.082 (-0.028 0.191)	-0.033 (-0.214 0.148)	0.034 (-0.174 0.243)
MPD Stops t-1	-0.004 (-0.028 0.020)	0.005 (-0.013 0.024)	0.017 (-0.013 0.046)	0.005 (-0.030 0.039)
MPD OIS t-1	-3.044 (-7.180 1.092)	-3.774 (-6.929 -0.618)	0.389 (-4.791 5.569)	-1.182 (-7.181 4.817)
Mean Max. Temp.	0.0004 (-0.00005 0.001)	0.0002 (-0.0002 0.0005)	0.0004 (-0.0001 0.001)	0.0005 (-0.0002 0.001)
Snow (in.)	0.015 (-0.003 0.033)	0.001 (-0.012 0.015)	0.017 (-0.005 0.040)	-0.003 (-0.029 0.023)
Precip. (in.)	-0.063 (-0.126 0.001)	-0.028 (-0.075 0.020)	-0.097 (-0.176 -0.018)	-0.033 (-0.125 0.058)
AR(1) Overall	0.320 (0.180 0.461)			
AR(2) Overall	0.311 (0.167 0.455)			
AR(3) Overall	0.110 (-0.033 0.253)			
AR(1) White		0.228 (0.089 0.367)		
AR(2) White		0.348 (0.213 0.482)		
AR(3) White		0.066 (-0.076 0.207)		
AR(1) Black			0.167 (0.032 0.302)	
AR(2) Black			0.102 (-0.035 0.239)	
AR(3) Black			0.147 (0.008 0.286)	
AR(1) Latine				-0.009 (-0.149 0.132)
AR(2) Latine				0.132 (-0.008 0.272)
AR(3) Latine				-0.040 (-0.180 0.099)
Constant	0.141 (0.029 0.252)	0.050 (0.0002 0.100)	0.013 (-0.064 0.090)	0.060 (-0.028 0.148)
Observations	216	216	216	216
R <sup>2</sup>	0.590	0.511	0.480	0.239
Residual Std. Error (df = 201)	0.049	0.037	0.061	0.070

Note:

95% Confidence Intervals in parentheses

Table A5: Interrupted Time Series Models of Alcohol Diagnoses, Minneapolis 2016-2020

	Alcohol Diagnoses/1,000			
	Overall	White	Black	Latine
	(1)	(2)	(3)	(4)
T	-0.0001 (-0.0003 0.0001)	0.0003 (0.0001 0.0004)	0.001 (0.0002 0.001)	0.001 (0.0003 0.001)
Post-Killing	0.026 (-0.054 0.106)	-0.006 (-0.043 0.030)	0.040 (-0.046 0.125)	0.058 (-0.031 0.148)
T Post-Killing	-0.004 (-0.007 -0.001)	-0.001 (-0.003 -0.0001)	-0.003 (-0.006 0.0005)	-0.0002 (-0.003 0.003)
COVID - State of Emerg.	-0.058 (-0.134 0.017)	0.004 (-0.031 0.038)	-0.058 (-0.137 0.021)	-0.054 (-0.136 0.029)
COVID - Stay at Home	0.005 (-0.072 0.082)	-0.017 (-0.052 0.017)	0.018 (-0.064 0.100)	0.025 (-0.060 0.111)
MPD Use of Force t-1	0.076 (-0.104 0.257)	0.014 (-0.067 0.094)	-0.045 (-0.235 0.145)	-0.101 (-0.302 0.099)
MPD Stops t-1	0.015 (-0.015 0.046)	0.010 (-0.004 0.023)	0.006 (-0.025 0.037)	0.016 (-0.016 0.049)
MPD OIS t-1	-2.966 (-8.130 2.197)	0.183 (-2.140 2.506)	1.554 (-3.915 7.023)	-1.636 (-7.362 4.090)
Mean Max. Temp.	0.001 (0.001 0.002)	0.0002 (-0.0001 0.0004)	0.0005 (-0.0001 0.001)	0.0004 (-0.0002 0.001)
Snow (in.)	0.002 (-0.020 0.025)	0.005 (-0.005 0.015)	0.009 (-0.015 0.033)	-0.012 (-0.037 0.013)
Precip. (in.)	-0.088 (-0.168 -0.008)	-0.014 (-0.050 0.021)	-0.050 (-0.135 0.036)	0.008 (-0.080 0.095)
AR(1) Overall	0.214 (0.073 0.355)			
AR(2) Overall	-0.026 (-0.165 0.113)			
AR(3) Overall	0.059 (-0.079 0.197)			
AR(1) White		0.133 (-0.004 0.270)		
AR(2) White		0.236 (0.100 0.371)		
AR(3) White		0.213 (0.075 0.352)		
AR(1) Black			0.243 (0.102 0.384)	
AR(2) Black			0.283 (0.144 0.422)	
AR(3) Black			0.020 (-0.119 0.160)	
AR(1) Latine				0.004 (-0.134 0.141)
AR(2) Latine				-0.078 (-0.217 0.061)
AR(3) Latine				0.023 (-0.116 0.162)
Constant	0.441 (0.299 0.583)	-0.001 (-0.035 0.033)	0.007 (-0.073 0.087)	0.045 (-0.040 0.130)
Observations	216	216	216	216
R <sup>2</sup>	0.579	0.575	0.517	0.209
Residual Std. Error (df = 201)	0.061	0.027	0.065	0.068

Note:

95% Confidence Intervals in parentheses

```

dm1 <- re_white_depress
dm2 <- re_blk_depress
dm3 <- re_latin_depress
dm4 <- re_int_white_depress
dm5 <- re_int_blk_depress
dm6 <- re_int_latin_depress

stargazer(dm1, dm2, dm3, dm4, dm5, dm6,
  title = "Interrupted Time Series RE Models of Depression Diagnoses, Minneapolis 2016-2020",
  covariate.labels = c("T",
    "Post-Killing", "T Post-Killing",
    "COVID - State of Emerg.", "COVID - Stay at Home",
    "MPD Use of Force t-1", "MPD Stops t-1",
    "MPD OIS t-1",
    "Mean Max. Temp.", "Snow (in.)", "Precip. (in.)",
    "Conc. Disad.",
    "AR(1)-White", "AR(2)-White", "AR(3)-White",
    "AR(1)-Black", "AR(2)-Black", "AR(3)-Black",
    "AR(1)-Latine", "AR(2)-Latine", "AR(3)-Latine",
    "Post-KillingXConc.Disad."),
  dep.var.caption = "Depression Diagnoses/1,000",
  dep.var.labels.include = FALSE,
  column.labels = c("White", "Black", "Latine",
    "White w/ Int.", "Black w/ Int.", "Latine w/ Int."),
  model.numbers = TRUE,
  single.row = FALSE,
  align = T,
  omit.stat = "adj.rsq",
  font.size="footnotesize",
  no.space = T,
  column.sep.width = "1pt",
  #star.cutoffs = c(.05, .01, .001), star.char = c("*", "**", "***"),
  report = "vcs",
  ci=TRUE,
  ci.level=0.95,
  ci.separator = "|",
  notes = "95\\% Confidence Intervals in parentheses",
  header = F,
  notes.append = F,
  add.lines = list(c("Resid. Var.",
    round(attr(VarCorr(re_white_depress), "sc")^2,2),
    round(attr(VarCorr(re_int_white_depress), "sc")^2,2),
    round(attr(VarCorr(re_blk_depress), "sc")^2,2),
    round(attr(VarCorr(re_int_blk_depress), "sc")^2,2),
    round(attr(VarCorr(re_latin_depress), "sc")^2,2),
    round(attr(VarCorr(re_int_latin_depress), "sc")^2,2)),
    c("ZCTA Var.",
      round(var_re_white_depress$zcta[1,1],2),
      round(var_re_int_white_depress$zcta[1,1],2),
      round(var_re_black_depress$zcta[1,1],2),
      round(var_re_int_black_depress$zcta[1,1],2),
      round(var_re_latin_depress$zcta[1,1],2),
      round(var_re_int_latin_depress$zcta[1,1],2)),
    c("Post-Floyd Var.",
      round(var_re_white_depress$zcta[2,2],2),
      round(var_re_int_white_depress$zcta[2,2],2),
      round(var_re_black_depress$zcta[2,2],2),
      round(var_re_int_black_depress$zcta[2,2],2),
      round(var_re_latin_depress$zcta[2,2],2),
      round(var_re_int_latin_depress$zcta[2,2],2))))

```



Table A6: Interrupted Time Series RE Models of Depression Diagnoses, Minneapolis 2016-2020

	Depression Diagnoses/1,000					
	White	Black	Latine	White w/ Int.	Black w/ Int.	Latine w/ Int.
	(1)	(2)	(3)	(4)	(5)	(6)
T	0.001 (0.001 0.001)	0.002 (0.001 0.004)	0.002 (0.001 0.003)	0.001 (0.001 0.001)	0.002 (0.001 0.004)	0.002 (0.001 0.003)
Post-Killing	-0.007 (-0.158 0.143)	2.461 (1.557 3.364)	0.199 (-0.202 0.599)	-0.006 (-0.157 0.145)	2.452 (1.549 3.356)	0.203 (-0.206 0.613)
T Post-Killing	-0.005 (-0.009 0.00002)	-0.048 (-0.076 -0.020)	-0.006 (-0.016 0.004)	-0.005 (-0.009 0.0001)	-0.048 (-0.076 -0.020)	-0.006 (-0.016 0.004)
COVID - State of Emerg.	-0.071 (-0.213 0.070)	-1.930 (-2.771 -1.089)	-0.291 (-0.595 0.012)	-0.073 (-0.214 0.069)	-1.929 (-2.770 -1.088)	-0.291 (-0.595 0.012)
COVID - Stay at Home	-0.017 (-0.164 0.129)	2.185 (1.316 3.053)	0.026 (-0.287 0.339)	-0.017 (-0.164 0.129)	2.185 (1.316 3.053)	0.026 (-0.287 0.339)
MPD Use of Force t-1	0.001 (-0.005 0.006)	0.026 (-0.004 0.057)	0.106 (0.088 0.124)	0.0003 (-0.005 0.006)	0.027 (-0.004 0.057)	0.106 (0.088 0.124)
MPD Stops t-1	0.013 (0.010 0.016)	0.022 (0.010 0.034)	0.001 (-0.006 0.008)	0.013 (0.010 0.015)	0.022 (0.010 0.034)	0.001 (-0.006 0.009)
MPD OIS t-1	-0.045 (-1.173 1.083)	-0.799 (-7.528 5.930)	-0.814 (-3.233 1.605)	-0.036 (-1.163 1.091)	-0.814 (-7.543 5.915)	-0.812 (-3.230 1.607)
Mean Max. Temp.	0.001 (-0.0001 0.002)	-0.002 (-0.007 0.003)	0.001 (-0.0005 0.003)	0.001 (-0.0001 0.002)	-0.002 (-0.007 0.003)	0.001 (-0.0005 0.003)
Snow (in.)	-0.013 (-0.054 0.029)	-0.101 (-0.347 0.144)	0.058 (-0.031 0.148)	-0.013 (-0.054 0.029)	-0.102 (-0.347 0.144)	0.058 (-0.031 0.148)
Precip. (in.)	-0.041 (-0.179 0.098)	-0.427 (-1.250 0.395)	-0.208 (-0.509 0.093)	-0.040 (-0.178 0.098)	-0.428 (-1.250 0.395)	-0.208 (-0.509 0.093)
Conc. Disad.	0.0003 (-0.074 0.074)	-0.162 (-0.322 -0.002)	-0.045 (-0.121 0.031)	-0.050 (-0.138 0.039)	-0.186 (-0.350 -0.021)	-0.079 (-0.225 0.066)
AR(1)-White	0.001 (-0.024 0.027)			0.001 (-0.025 0.027)		
AR(2)-White	0.006 (-0.019 0.032)			0.007 (-0.019 0.033)		
AR(3)-White	0.006 (-0.020 0.031)			0.005 (-0.020 0.031)		
AR(1)-Black		-0.007 (-0.033 0.019)			-0.007 (-0.033 0.019)	
AR(2)-Black		0.027 (0.002 0.053)			0.027 (0.001 0.053)	
AR(3)-Black		0.0003 (-0.026 0.026)			0.0001 (-0.026 0.026)	
AR(1)-Latine			-0.005 (-0.032 0.021)			-0.005 (-0.032 0.021)
AR(2)-Latine			-0.002 (-0.028 0.024)			-0.002 (-0.028 0.024)
AR(3)-Latine			-0.006 (-0.032 0.020)			-0.006 (-0.032 0.020)
Post-KillingXConc.Disad.				0.054 (0.004 0.104)	-0.181 (-0.487 0.126)	0.073 (-0.193 0.340)
Constant	0.124 (0.019 0.229)	0.330 (-0.032 0.693)	-0.123 (-0.309 0.062)	0.127 (0.017 0.238)	0.331 (-0.031 0.694)	-0.123 (-0.314 0.068)
Resid. Var.	0.3	0.3	10.68	10.68	1.39	1.39
ZCTA Var.	0.04	0.05	0.1	0.09	0.1	0.12
Post-Floyd Var.	0	0	0.17	0.16	0.33	0.37
Observations	5,720	5,720	5,516	5,720	5,720	5,516
Log Likelihood	-4,788.967	-14,935.860	-8,807.598	-4,789.637	-14,936.130	-8,808.581
Akaike Inf. Crit.	9,617.934	29,911.730	17,655.190	9,621.274	29,914.270	17,659.160
Bayesian Inf. Crit.	9,750.968	30,044.760	17,787.500	9,760.960	30,053.950	17,798.090

Note:

95% Confidence Intervals in parentheses

```

am1 <- re_white_anxiety
am2 <- re_blk_anxiety
am3 <- re_latin_anxiety
am4 <- re_int_white_anxiety
am5 <- re_int_blk_anxiety
am6 <- re_int_latin_anxiety

stargazer(am1, am2, am3, am4, am5, am6,
  title = "Interrupted Time Series RE Models of Anxiety Diagnoses, Minneapolis 2016-2020",
  covariate.labels = c("T",
    "Post-Killing", "T Post-Killing",
    "COVID - State of Emerg.", "COVID - Stay at Home",
    "MPD Use of Force t-1", "MPD Stops t-1",
    "MPD OIS t-1",
    "Mean Max. Temp.", "Snow (in.)", "Precip. (in.)",
    "Conc. Disad.",
    "AR(1)-White", "AR(2)-White", "AR(3)-White",
    "AR(1)-Black", "AR(2)-Black", "AR(3)-Black",
    "AR(1)-Latine", "AR(2)-Latine", "AR(3)-Latine",
    "Post-KillingXConc.Disad."),
  dep.var.caption = "Anxiety Diagnoses/1,000",
  dep.var.labels.include = FALSE,
  column.labels = c("White", "Black", "Latine",
    "White w/ Int.", "Black w/ Int.", "Latine w/ Int."),
  model.numbers = TRUE,
  single.row = FALSE,
  align = T,
  omit.stat = "adj.rsq",
  font.size="footnotesize",
  no.space = T,
  column.sep.width = "1pt",
  #star.cutoffs = c(.05, .01, .001), star.char = c("*", "**", "***"),
  report = "vcs",
  ci=TRUE,
  ci.level=0.95,
  ci.separator = "|",
  notes = "95\\% Confidence Intervals in parentheses",
  header = F,
  notes.append = F,
  add.lines = list(c("Resid. Var.",
    round(attr(VarCorr(re_white_anxiety), "sc")^2,2),
    round(attr(VarCorr(re_int_white_anxiety), "sc")^2,2),
    round(attr(VarCorr(re_blk_anxiety), "sc")^2,2),
    round(attr(VarCorr(re_int_blk_anxiety), "sc")^2,2),
    round(attr(VarCorr(re_latin_anxiety), "sc")^2,2),
    round(attr(VarCorr(re_int_latin_anxiety), "sc")^2,2)),
    c("ZCTA Var.",
      round(var_re_white_anxiety$zcta[1,1],2),
      round(var_re_int_white_anxiety$zcta[1,1],2),
      round(var_re_black_anxiety$zcta[1,1],2),
      round(var_re_int_black_anxiety$zcta[1,1],2),
      round(var_re_latin_anxiety$zcta[1,1],2),
      round(var_re_int_latin_anxiety$zcta[1,1],2)),
    c("Post-Floyd Var.",
      round(var_re_white_anxiety$zcta[2,2],2),
      round(var_re_int_white_anxiety$zcta[2,2],2),
      round(var_re_black_anxiety$zcta[2,2],2),
      round(var_re_int_black_anxiety$zcta[2,2],2),
      round(var_re_latin_anxiety$zcta[2,2],2),
      round(var_re_int_latin_anxiety$zcta[2,2],2))))

```

Table A7: Interrupted Time Series RE Models of Anxiety Diagnoses, Minneapolis 2016-2020

	Anxiety Diagnoses/1,000					
	White	Black	Latine	White w/ Int.	Black w/ Int.	Latine w/ Int.
	(1)	(2)	(3)	(4)	(5)	(6)
T	0.001 (0.001 0.002)	0.001 (0.001 0.002)	0.002 (0.001 0.002)	0.001 (0.001 0.002)	0.001 (0.001 0.002)	0.002 (0.001 0.002)
Post-Killing	-0.011 (-0.152 0.129)	0.020 (-0.461 0.500)	-0.020 (-0.372 0.331)	-0.009 (-0.151 0.133)	0.022 (-0.458 0.502)	-0.017 (-0.369 0.334)
T Post-Killing	-0.006 (-0.010 -0.002)	-0.012 (-0.027 0.003)	-0.008 (-0.019 0.003)	-0.006 (-0.010 -0.001)	-0.012 (-0.027 0.003)	-0.008 (-0.019 0.003)
COVID - State of Emerg.	-0.088 (-0.221 0.044)	-0.046 (-0.502 0.409)	-0.066 (-0.399 0.266)	-0.090 (-0.223 0.042)	-0.046 (-0.502 0.409)	-0.067 (-0.400 0.265)
COVID - Stay at Home	-0.054 (-0.190 0.083)	-0.131 (-0.602 0.339)	0.042 (-0.301 0.385)	-0.054 (-0.190 0.083)	-0.131 (-0.601 0.339)	0.043 (-0.301 0.386)
MPD Use of Force t-1	-0.011 (-0.016 -0.006)	0.009 (-0.006 0.025)	0.020 (0.0003 0.040)	-0.011 (-0.017 -0.006)	0.009 (-0.006 0.025)	0.020 (0.0005 0.040)
MPD Stops t-1	-0.001 (-0.004 0.001)	0.029 (0.023 0.034)	0.007 (0.0001 0.014)	-0.002 (-0.005 0.001)	0.029 (0.023 0.034)	0.007 (-0.0005 0.014)
MPD OIS t-1	-0.230 (-1.285 0.824)	-0.030 (-3.649 3.590)	-0.442 (-3.094 2.209)	-0.218 (-1.272 0.836)	-0.019 (-3.639 3.602)	-0.431 (-3.082 2.220)
Mean Max. Temp.	0.0005 (-0.0003 0.001)	-0.0001 (-0.003 0.003)	0.002 (0.0004 0.004)	0.0005 (-0.0003 0.001)	-0.0001 (-0.003 0.003)	0.002 (0.0004 0.004)
Snow (in.)	0.009 (-0.030 0.047)	0.051 (-0.081 0.184)	0.053 (-0.045 0.150)	0.009 (-0.030 0.047)	0.051 (-0.081 0.184)	0.053 (-0.045 0.150)
Precip. (in.)	0.063 (-0.066 0.193)	-0.489 (-0.935 0.044)	-0.235 (-0.565 0.095)	0.064 (-0.065 0.194)	-0.489 (-0.935 0.043)	-0.235 (-0.565 0.095)
Conc. Disad.	-0.065 (-0.159 0.030)	-0.061 (-0.109 -0.012)	-0.034 (-0.119 0.052)	-0.142 (-0.253 -0.030)	-0.067 (-0.120 -0.015)	-0.058 (-0.152 0.036)
AR(1)-White	0.006 (-0.020 0.032)			0.006 (-0.020 0.032)		
AR(2)-White	0.007 (-0.019 0.033)			0.007 (-0.019 0.033)		
AR(3)-White	-0.006 (-0.032 0.020)			-0.006 (-0.032 0.020)		
AR(1)-Black		-0.006 (-0.031 0.020)			-0.006 (-0.031 0.020)	
AR(2)-Black		-0.011 (-0.036 0.015)			-0.011 (-0.036 0.015)	
AR(3)-Black		-0.002 (-0.028 0.024)			-0.002 (-0.028 0.023)	
AR(1)-Latine			0.003 (-0.023 0.030)			0.003 (-0.024 0.030)
AR(2)-Latine			-0.005 (-0.032 0.021)			-0.005 (-0.032 0.022)
AR(3)-Latine			-0.006 (-0.033 0.020)			-0.007 (-0.033 0.020)
Post-KillingXConc.Disad.				0.068 (0.021 0.115)	0.050 (-0.091 0.191)	0.067 (-0.041 0.176)
Constant	0.126 (-0.011 0.262)	0.127 (-0.056 0.311)	-0.086 (-0.248 0.076)	0.131 (-0.017 0.279)	0.128 (-0.056 0.311)	-0.084 (-0.246 0.079)
Resid. Var.	0.26	0.26	3.13	3.13	1.67	1.67
ZCTA Var.	0.09	0.11	0	0	0.04	0.04
Post-Floyd Var.	0	0	0	0	0	0
Observations	5,720	5,720	5,516	5,720	5,720	5,516
Log Likelihood	-4,415.054	-11,421.210	-9,292.793	-4,414.294	-11,422.680	-9,294.035
Akaike Inf. Crit.	8,870.108	22,882.420	18,625.590	8,870.589	22,887.370	18,630.070
Bayesian Inf. Crit.	9,003.143	23,015.450	18,757.900	9,010.275	23,027.050	18,768.990

Note:

95% Confidence Intervals in parentheses

```

am1 <- re_white_alcohol
am2 <- re_blk_alcohol
am3 <- re_latin_alcohol
am4 <- re_int_white_alcohol
am5 <- re_int_blk_alcohol
am6 <- re_int_latin_alcohol

stargazer(am1, am2, am3, am4, am5, am6,
  title = "Interrupted Time Series RE Models of Alcohol Diagnoses, Minneapolis 2016-2020",
  covariate.labels = c("T",
    "Post-Killing", "T Post-Killing",
    "COVID - State of Emerg.", "COVID - Stay at Home",
    "MPD Use of Force t-1", "MPD Stops t-1",
    "MPD OIS t-1",
    "Mean Max. Temp.", "Snow (in.)", "Precip. (in.)",
    "Conc. Disad.",
    "AR(1)-White", "AR(2)-White", "AR(3)-White",
    "AR(1)-Black", "AR(2)-Black", "AR(3)-Black",
    "AR(1)-Latine", "AR(2)-Latine", "AR(3)-Latine",
    "Post-KillingXConc.Disad."),
  dep.var.caption = "Alcohol Diagnoses/1,000",
  dep.var.labels.include = FALSE,
  column.labels = c("White", "Black", "Latine",
    "White w/ Int.", "Black w/ Int.", "Latine w/ Int."),
  model.numbers = TRUE,
  single.row = FALSE,
  align = T,
  omit.stat = "adj.rsq",
  font.size="footnotesize",
  no.space = T,
  column.sep.width = "1pt",
  #star.cutoffs = c(.05, .01, .001), star.char = c("*", "**", "***"),
  report = "vcs",
  ci=TRUE,
  ci.level=0.95,
  ci.separator = "|",
  notes = "95\\% Confidence Intervals in parentheses",
  header = F,
  notes.append = F,
  add.lines = list(c("Resid. Var.",
    round(attr(VarCorr(re_white_alcohol), "sc")^2,2),
    round(attr(VarCorr(re_int_white_alcohol), "sc")^2,2),
    round(attr(VarCorr(re_blk_alcohol), "sc")^2,2),
    round(attr(VarCorr(re_int_blk_alcohol), "sc")^2,2),
    round(attr(VarCorr(re_latin_alcohol), "sc")^2,2),
    round(attr(VarCorr(re_int_latin_alcohol), "sc")^2,2)),
    c("ZCTA Var.",
      round(var_re_white_alcohol$zcta[1,1],2),
      round(var_re_int_white_alcohol$zcta[1,1],2),
      round(var_re_black_alcohol$zcta[1,1],2),
      round(var_re_int_black_alcohol$zcta[1,1],2),
      round(var_re_latin_alcohol$zcta[1,1],2),
      round(var_re_int_latin_alcohol$zcta[1,1],2)),
    c("Post-Floyd Var.",
      round(var_re_white_alcohol$zcta[2,2],2),
      round(var_re_int_white_alcohol$zcta[2,2],2),
      round(var_re_black_alcohol$zcta[2,2],2),
      round(var_re_int_black_alcohol$zcta[2,2],2),
      round(var_re_latin_alcohol$zcta[2,2],2),
      round(var_re_int_latin_alcohol$zcta[2,2],2))))

```

Table A8: Interrupted Time Series RE Models of Alcohol Diagnoses, Minneapolis 2016-2020

	Alcohol Diagnoses/1,000					
	White	Black	Latine	White w/ Int.	Black w/ Int.	Latine w/ Int.
	(1)	(2)	(3)	(4)	(5)	(6)
T	0.001 (0.001 0.001)	0.002 (0.001 0.003)	0.002 (0.001 0.003)	0.001 (0.001 0.001)	0.002 (0.001 0.003)	0.002 (0.001 0.003)
Post-Killing	-0.095 (-0.248 0.058)	2.453 (1.728 3.179)	0.140 (-0.618 0.899)	-0.096 (-0.249 0.058)	2.441 (1.720 3.161)	0.140 (-0.621 0.901)
T Post-Killing	-0.005 (-0.010 -0.00003)	-0.046 (-0.066 -0.026)	-0.005 (-0.028 0.019)	-0.005 (-0.010 -0.00003)	-0.046 (-0.066 -0.026)	-0.005 (-0.028 0.019)
COVID - State of Emerg.	0.072 (-0.071 0.216)	-1.711 (-2.310 -1.112)	-0.323 (-1.037 0.391)	0.072 (-0.071 0.216)	-1.710 (-2.309 -1.111)	-0.321 (-1.035 0.393)
COVID - Stay at Home	-0.072 (-0.220 0.077)	1.971 (1.352 2.590)	0.277 (-0.460 1.014)	-0.071 (-0.220 0.077)	1.971 (1.352 2.590)	0.276 (-0.460 1.013)
MPD Use of Force t-1	-0.014 (-0.020 -0.009)	-0.034 (-0.056 -0.011)	0.112 (0.069 0.155)	-0.014 (-0.020 -0.008)	-0.033 (-0.055 -0.010)	0.111 (0.068 0.155)
MPD Stops t-1	0.008 (0.005 0.011)	0.028 (0.019 0.038)	-0.039 (-0.056 -0.022)	0.008 (0.006 0.011)	0.029 (0.020 0.039)	-0.038 (-0.055 -0.020)
MPD OIS t-1	-0.077 (-1.219 1.065)	-0.629 (-5.450 4.192)	-1.793 (-7.489 3.902)	-0.078 (-1.221 1.064)	-0.630 (-5.452 4.191)	-1.799 (-7.495 3.897)
Mean Max. Temp.	0.001 (0.0004 0.002)	-0.002 (-0.006 0.001)	0.0002 (-0.004 0.004)	0.001 (0.0004 0.002)	-0.003 (-0.006 0.001)	0.0002 (-0.004 0.004)
Snow (in.)	0.042 (0.0003 0.084)	-0.033 (-0.207 0.142)	-0.129 (-0.338 0.081)	0.042 (0.0003 0.084)	-0.033 (-0.207 0.142)	-0.128 (-0.338 0.081)
Precip. (in.)	0.060 (-0.080 0.201)	0.508 (-0.078 1.093)	0.067 (-0.642 0.775)	0.060 (-0.080 0.201)	0.507 (-0.079 1.093)	0.066 (-0.643 0.775)
Conc. Disad.	-0.117 (-0.222 -0.013)	-0.120 (-0.260 0.020)	-0.433 (-0.771 -0.095)	-0.124 (-0.231 -0.017)	-0.106 (-0.243 0.032)	-0.421 (-0.760 -0.081)
AR(1)-White	-0.008 (-0.034 0.018)			-0.008 (-0.034 0.018)		
AR(2)-White	0.010 (-0.016 0.036)			0.010 (-0.016 0.036)		
AR(3)-White	0.005 (-0.021 0.030)			0.005 (-0.021 0.030)		
AR(1)-Black		0.002 (-0.024 0.028)			0.002 (-0.024 0.028)	
AR(2)-Black		-0.012 (-0.038 0.013)			-0.013 (-0.038 0.013)	
AR(3)-Black		0.003 (-0.023 0.028)			0.002 (-0.023 0.028)	
AR(1)-Latine			0.001 (-0.025 0.027)			0.001 (-0.026 0.027)
AR(2)-Latine			-0.004 (-0.031 0.022)			-0.004 (-0.030 0.022)
AR(3)-Latine			0.005 (-0.021 0.031)			0.005 (-0.021 0.031)
Post-KillingXConc.Disad.				-0.017 (-0.064 0.030)	-0.292 (-0.685 0.101)	-0.038 (-0.287 0.211)
Constant	0.021 (-0.120 0.163)	0.143 (-0.125 0.412)	0.193 (-0.261 0.647)	0.021 (-0.120 0.163)	0.141 (-0.126 0.408)	0.189 (-0.262 0.640)
Resid. Var.	0.31	0.31	5.42	5.42	7.68	7.68
ZCTA Var.	0.1	0.1	0.08	0.07	0.66	0.65
Post-Floyd Var.	0	0	0.73	0.68	0.05	0.07
Observations	5,720	5,720	5,516	5,720	5,720	5,516
Log Likelihood	-4,869.947	-13,014.270	-13,512.890	-4,872.546	-13,013.910	-13,514.000
Akaike Inf. Crit.	9,779.893	26,068.540	27,065.770	9,787.091	26,069.830	27,070.010
Bayesian Inf. Crit.	9,912.928	26,201.580	27,198.080	9,926.777	26,209.510	27,208.930

Note:

95% Confidence Intervals in parentheses

```

stargazer(ts_ar3_nl, ts_ar3_white_nl, ts_ar3_black_nl, ts_ar3_latine_nl,
  title = "Interrupted Nonlinear Time Series Models of Mental Health Diagnoses, Minneapolis 2016-2020",
  covariate.labels = c("T", "T-Squared",
    "Post-Killing", "T Post-Killing",
    "T Post-Killing-Squared",
    "COVID - State of Emerg.", "COVID - Stay at Home",
    "MPD Use of Force t-1", "MPD Stops t-1",
    "MPD OIS t-1",
    "Mean Max. Temp.", "Snow (in.)", "Precip. (in.)",
    "AR(1) Overall", "AR(2) Overall", "AR(3) Overall",
    "AR(1) White", "AR(2) White", "AR(3) White",
    "AR(1) Black", "AR(2) Black", "AR(3) Black",
    "AR(1) Latine", "AR(2) Latine", "AR(3) Latine"),
  dep.var.caption = "Mental Health Diagnoses/1,000",
  dep.var.labels.include = FALSE,
  column.labels = c("Overall", "White", "Black", "Latine"),
  model.numbers = TRUE,
  single.row = FALSE,
  align = T,
  omit.stat = c("adj.rsq", "f"),
  font.size="footnotesize", no.space = T, column.sep.width = "1pt",
  #star.cutoffs = c(.05, .01, .001), star.char = c("","**","***"),
  report = "vcs",
  ci=TRUE,
  ci.level=0.95,
  ci.separator = "|",
  notes = "95\\% Confidence Intervals in parentheses",
  header = F,
  notes.append = F)

```

```

nl1 <- re_white_nl
nl2 <- re_blk_nl
nl3 <- re_latine_nl
nl4 <- re_int_white_nl
nl5 <- re_int_blk_nl
nl6 <- re_int_latine_nl

```

```

stargazer(nl1,nl2,nl3,nl4,nl5,nl6,
  title = "Interrupted Nonlinear Time Series RE Models of Mental Health Diagnoses, Minneapolis 2016-2020",
  covariate.labels = c("T", "T-Squared",
    "Post-Killing", "T Post-Killing",
    "T Post-Killing-Squared",
    "COVID - State of Emerg.", "COVID - Stay at Home",
    "MPD Use of Force t-1", "MPD Stops t-1",
    "MPD OIS t-1",
    "Mean Max. Temp.", "Snow (in.)", "Precip. (in.)",
    "Conc. Disad.",
    "AR(1)-White", "AR(2)-White", "AR(3)-White",
    "AR(1)-Black", "AR(2)-Black", "AR(3)-Black",
    "AR(1)-Latine", "AR(2)-Latine", "AR(3)-Latine",
    "Post-KillingXConc.Disad."),
  dep.var.caption = "Mental Health Diagnoses/1,000",
  dep.var.labels.include = FALSE,
  column.labels = c("White", "Black", "Latine",
    "White w/ Int.", "Black w/ Int.", "Latine w/ Int."),
  model.numbers = TRUE,
  single.row = FALSE,
  align = T,
  omit.stat = "adj.rsq",
  font.size="footnotesize",
  no.space = T,

```

Table A9: Interrupted Nonlinear Time Series Models of Mental Health Diagnoses, Minneapolis 2016-2020

	Mental Health Diagnoses/1,000			
	Overall	White	Black	Latine
	(1)	(2)	(3)	(4)
T	0.003 (0.001 0.006)	0.006 (0.004 0.008)	0.011 (0.007 0.015)	0.006 (0.003 0.009)
T-Squared	-0.00001 (-0.00002 -0.00000)	-0.00002 (-0.00002 -0.00001)	-0.00003 (-0.00005 -0.00002)	-0.00001 (-0.00002 -0.00001)
Post-Killing	0.115 (-0.059 0.290)	0.052 (-0.030 0.135)	0.273 (0.083 0.463)	0.017 (-0.172 0.205)
T Post-Killing	0.009 (-0.011 0.030)	0.015 (0.005 0.024)	-0.003 (-0.026 0.019)	0.010 (-0.012 0.032)
T Post-Killing-Squared	-0.001 (-0.001 0.0001)	-0.001 (-0.001 -0.0002)	-0.0001 (-0.001 0.001)	-0.0003 (-0.001 0.0004)
COVID - State of Emerg.	-0.186 (-0.348 -0.024)	-0.059 (-0.134 0.017)	-0.189 (-0.362 -0.016)	-0.035 (-0.209 0.139)
COVID - Stay at Home	0.084 (-0.079 0.246)	0.030 (-0.046 0.105)	0.154 (-0.022 0.331)	-0.010 (-0.184 0.165)
MPD Use of Force t-1	0.431 (0.065 0.797)	0.203 (0.029 0.377)	0.165 (-0.229 0.559)	-0.020 (-0.416 0.376)
MPD Stops t-1	-0.033 (-0.094 0.028)	0.022 (-0.008 0.051)	0.043 (-0.022 0.109)	0.022 (-0.044 0.088)
MPD OIS t-1	-9.654 (-20.231 0.923)	-1.940 (-6.944 3.063)	3.359 (-7.997 14.716)	1.102 (-10.327 12.531)
Mean Max. Temp.	0.001 (0.0002 0.002)	0.0001 (-0.0004 0.001)	-0.0001 (-0.001 0.001)	0.0003 (-0.001 0.002)
Snow (in.)	0.003 (-0.043 0.049)	0.002 (-0.019 0.024)	-0.016 (-0.066 0.033)	-0.029 (-0.079 0.022)
Precip. (in.)	-0.221 (-0.386 -0.057)	-0.042 (-0.119 0.034)	-0.140 (-0.313 0.033)	0.005 (-0.171 0.180)
AR(1) Overall	0.271 (0.135 0.407)			
AR(2) Overall	0.225 (0.088 0.362)			
AR(3) Overall	0.101 (-0.033 0.234)			
AR(1) White		0.275 (0.134 0.417)		
AR(2) White		0.071 (-0.075 0.217)		
AR(3) White		-0.045 (-0.187 0.098)		
AR(1) Black			0.222 (0.083 0.360)	
AR(2) Black			0.073 (-0.069 0.214)	
AR(3) Black			0.121 (-0.017 0.258)	
AR(1) Latine				0.027 (-0.114 0.167)
AR(2) Latine				0.073 (-0.067 0.213)
AR(3) Latine				0.063 (-0.075 0.202)
Constant	0.683 (0.340 1.026)	-0.055 (-0.143 0.034)	-0.323 (-0.542 -0.104)	-0.042 (-0.243 0.159)
Observations	216	216	216	216
R <sup>2</sup>	0.737	0.753	0.773	0.422
Residual Std. Error (df = 199)	0.124	0.058	0.133	0.134

Note:

95% Confidence Intervals in parentheses

```

column.sep.width = "1pt",
#star.cutoffs = c(.05, .01, .001), star.char = c("","**","***"),
report = "vcs",
ci=TRUE,
ci.level=0.95,
ci.separator = "|",
notes = "95\\% Confidence Intervals in parentheses",
header = F,
notes.append = F,
add.lines = list(c("Resid. Var.", round(attr(VarCorr(re_white_nl), "sc")^2,2),
round(attr(VarCorr(re_int_white_nl), "sc")^2,2),
round(attr(VarCorr(re_blk_nl), "sc")^2,2),
round(attr(VarCorr(re_int_blk_nl), "sc")^2,2),
round(attr(VarCorr(re_latn_nl), "sc")^2,2),
round(attr(VarCorr(re_int_latn_nl), "sc")^2,2)),
c("ZCTA Var.",
round(var_re_white_nl$zcta[1,1],2),
round(var_re_int_white_nl$zcta[1,1],2),
round(var_re_black_nl$zcta[1,1],2),
round(var_re_int_black_nl$zcta[1,1],2),
round(var_re_latn_nl$zcta[1,1],2),
round(var_re_int_latn_nl$zcta[1,1],2)),
c("Post-Floyd Var.",
round(var_re_white_nl$zcta[2,2],2),
round(var_re_int_white_nl$zcta[2,2],2),
round(var_re_black_nl$zcta[2,2],2),
round(var_re_int_black_nl$zcta[2,2],2),
round(var_re_latn_nl$zcta[2,2],2),
round(var_re_int_latn_nl$zcta[2,2],2))))

```

```

tsc1 <- ts_ar3_chronic
tsc2 <- ts_ar3_white_chronic
tsc3 <- ts_ar3_black_chronic
tsc4 <- ts_ar3_latn_chronic

```

```

stargazer(tsc1,tsc2,tsc3,tsc4,
title = "Interrupted Time Series Models of Chronic Mental Health Diagnoses, Minneapolis 2016-2020",
covariate.labels = c("T",
"Post-Killing", "T Post-Killing",
"COVID - State of Emerg.", "COVID - Stay at Home",
"MPD Use of Force t-1", "MPD Stops t-1",
"MPD OIS t-1",
"Mean Max. Temp.", "Snow (in.)", "Precip. (in.)",
"AR(1) Overall", "AR(2) Overall", "AR(3) Overall",
"AR(1) White", "AR(2) White", "AR(3) White",
"AR(1) Black", "AR(2) Black", "AR(3) Black",
"AR(1) Latine", "AR(2) Latine", "AR(3) Latine"),
dep.var.caption = "Chronic MH Diagnoses/1,000",
dep.var.labels.include = FALSE,
column.labels = c("Overall", "White", "Black", "Latine"),
model.numbers = TRUE,
single.row = FALSE,
align = T,
omit.stat = c("adj.rsq", "f"),
font.size="footnotesize", no.space = T, column.sep.width = "1pt",
#star.cutoffs = c(.05, .01, .001), star.char = c("","**","***"),
report = "vcs",
ci=TRUE,
ci.level=0.95,
ci.separator = "|",
notes = "95\\% Confidence Intervals in parentheses",

```



Table A10: Interrupted Nonlinear Time Series RE Models of Mental Health Diagnoses, Minneapolis 2016-2020

	Mental Health Diagnoses/1,000					
	White (1)	Black (2)	Latine (3)	White w/ Int. (4)	Black w/ Int. (5)	Latine w/ Int. (6)
T	0.008 (0.006 0.010)	0.010 (0.003 0.017)	0.021 (0.003 0.039)	0.008 (0.006 0.009)	0.010 (0.003 0.017)	0.021 (0.003 0.039)
T-Squared	-0.00002 (-0.00003 -0.00002)	-0.00001 (-0.00005 0.00002)	-0.0001 (-0.0001 0.00002)	-0.00002 (-0.00003 -0.00002)	-0.00001 (-0.00005 0.00002)	-0.0001 (-0.0001 0.00001)
Post-Killing	-0.128 (-0.394 0.138)	3.005 (1.889 4.121)	-0.162 (-2.837 2.512)	-0.114 (-0.394 0.166)	3.006 (1.887 4.124)	-0.152 (-2.828 2.524)
T Post-Killing	0.005 (-0.022 0.033)	-0.198 (-0.321 -0.075)	0.055 (-0.243 0.352)	0.005 (-0.022 0.033)	-0.198 (-0.321 -0.075)	0.055 (-0.242 0.352)
T Post-Killing-Squared	-0.0004 (-0.001 0.0004)	0.004 (0.0003 0.008)	-0.001 (-0.010 0.008)	-0.0004 (-0.001 0.0004)	0.004 (0.0003 0.008)	-0.001 (-0.010 0.008)
COVID - State of Emerg.	0.053 (-0.176 0.282)	-1.920 (-2.935 -0.904)	-0.549 (-3.018 1.919)	0.045 (-0.183 0.273)	-1.920 (-2.936 -0.905)	-0.555 (-3.023 1.914)
COVID - Stay at Home	-0.116 (-0.348 0.115)	1.722 (0.694 2.749)	0.575 (-1.920 3.070)	-0.116 (-0.346 0.115)	1.722 (0.694 2.749)	0.576 (-1.918 3.071)
MPD Use of Force t-1	-0.029 (-0.038 -0.020)	-0.062 (-0.101 -0.023)	0.514 (0.374 0.655)	-0.029 (-0.038 -0.020)	-0.063 (-0.102 -0.024)	0.515 (0.374 0.656)
MPD Stops t-1	0.007 (0.003 0.011)	0.014 (-0.004 0.032)	-0.074 (-0.128 -0.020)	0.005 (0.001 0.009)	0.013 (-0.005 0.031)	-0.079 (-0.134 -0.024)
MPD OIS t-1	-0.713 (-2.447 1.022)	-1.870 (-9.596 5.855)	-4.478 (-23.223 14.267)	-0.674 (-2.405 1.056)	-1.865 (-9.591 5.861)	-4.443 (-23.187 14.302)
Mean Max. Temp.	0.001 (-0.001 0.002)	-0.001 (-0.006 0.005)	-0.007 (-0.022 0.007)	0.001 (-0.001 0.002)	-0.001 (-0.006 0.005)	-0.007 (-0.022 0.007)
Snow (in.)	0.006 (-0.058 0.069)	-0.083 (-0.366 0.200)	-0.505 (-1.198 0.188)	0.006 (-0.058 0.069)	-0.083 (-0.366 0.199)	-0.506 (-1.198 0.187)
Precip. (in.)	-0.045 (-0.259 0.169)	-0.517 (-1.467 0.433)	5.989 (3.628 8.350)	-0.040 (-0.254 0.173)	-0.516 (-1.466 0.434)	5.994 (3.633 8.354)
Conc. Disad.	-0.236 (-0.422 -0.051)	-0.710 (-1.126 -0.294)	-0.640 (-1.411 0.130)	-0.636 (-0.877 -0.395)	-0.751 (-1.280 -0.222)	-0.779 (-1.626 0.067)
AR(1)-White	-0.006 (-0.032 0.019)			-0.006 (-0.032 0.019)		
AR(2)-White	0.027 (0.001 0.053)			0.028 (0.002 0.054)		
AR(3)-White	-0.006 (-0.032 0.020)			-0.007 (-0.033 0.018)		
AR(1)-Black		-0.010 (-0.036 0.016)			-0.010 (-0.036 0.016)	
AR(2)-Black		0.020 (-0.005 0.046)			0.020 (-0.005 0.046)	
AR(3)-Black		0.004 (-0.022 0.030)			0.004 (-0.022 0.030)	
AR(1)-Latine			-0.004 (-0.030 0.023)			-0.004 (-0.030 0.023)
AR(2)-Latine			-0.011 (-0.038 0.015)			-0.011 (-0.038 0.015)
AR(3)-Latine			-0.007 (-0.033 0.019)			-0.007 (-0.033 0.019)
Post-KillingXConc.Disad.				0.336 (0.227 0.445)	0.041 (-0.323 0.406)	0.312 (-0.448 1.073)
Constant	0.162 (-0.170 0.495)	0.437 (-0.250 1.124)	-0.232 (-1.600 1.136)	0.188 (-0.230 0.605)	0.440 (-0.256 1.136)	-0.216 (-1.599 1.166)
Resid. Var.	0.72	0.71	14.11	14.11	83.2	83.19
ZCTA Var.	0.58	0.94	1.59	1.66	3.34	3.56
Post-Floyd Var.	0.05	0.1	0.2	0.23	0.14	0.18
Observations	5,720	5,720	5,516	5,720	5,720	5,516
Log Likelihood	-7,286.450	-15,761.220	-20,072.060	-7,273.063	-15,761.970	-20,071.780
Akaike Inf. Crit.	14,616.900	31,566.440	40,188.110	14,592.120	31,569.940	40,189.550
Bayesian Inf. Crit.	14,763.240	31,712.770	40,333.650	14,745.110	31,722.930	40,341.710

Note:

95% Confidence Intervals in parentheses

```
header = F,
notes.append = F)
```

Table A11: Interrupted Time Series Models of Chronic Mental Health Diagnoses, Minneapolis 2016-2020

	Chronic MH Diagnoses/1,000			
	Overall	White	Black	Latine
	(1)	(2)	(3)	(4)
T	0.00002 (0.00000 0.00004)	-0.00000 (-0.00001 0.00001)	-0.00000 (-0.00004 0.00003)	0.00002 (-0.00001 0.00004)
Post-Killing	0.004 (-0.001 0.009)	-0.0004 (-0.004 0.003)	-0.002 (-0.012 0.009)	-0.007 (-0.016 0.001)
T Post-Killing	-0.0001 (-0.0003 0.00004)	0.00001 (-0.0001 0.0001)	0.00003 (-0.0003 0.0004)	0.0001 (-0.0002 0.0004)
COVID - State of Emerg.	-0.001 (-0.006 0.004)	-0.001 (-0.003 0.002)	-0.002 (-0.012 0.008)	0.009 (0.001 0.017)
COVID - Stay at Home	0.001 (-0.004 0.006)	0.002 (-0.001 0.005)	0.008 (-0.002 0.019)	-0.005 (-0.014 0.003)
MPD Use of Force t-1	0.003 (-0.008 0.014)	-0.007 (-0.014 0.0003)	-0.023 (-0.048 0.001)	-0.010 (-0.029 0.009)
MPD Stops t-1	0.001 (-0.001 0.003)	-0.001 (-0.002 0.0003)	-0.003 (-0.007 0.001)	0.001 (-0.002 0.004)
MPD OIS t-1	0.289 (-0.029 0.608)	-0.041 (-0.242 0.159)	-0.150 (-0.853 0.553)	0.109 (-0.437 0.654)
Mean Max. Temp.	0.00001 (-0.00002 0.00004)	0.00002 (-0.00000 0.00004)	0.0001 (-0.00001 0.0001)	0.00000 (-0.0001 0.0001)
Snow (in.)	0.0003 (-0.001 0.002)	-0.0003 (-0.001 0.001)	-0.001 (-0.004 0.002)	-0.001 (-0.004 0.001)
Precip. (in.)	-0.0003 (-0.005 0.005)	-0.002 (-0.005 0.001)	-0.008 (-0.018 0.003)	0.006 (-0.002 0.015)
AR(1) Overall	-0.036 (-0.175 0.102)			
AR(2) Overall	0.096 (-0.042 0.234)			
AR(3) Overall	-0.050 (-0.188 0.087)			
AR(1) White		-0.034 (-0.168 0.100)		
AR(2) White		-0.019 (-0.152 0.115)		
AR(3) White		-0.149 (-0.282 -0.015)		
AR(1) Black			-0.033 (-0.167 0.101)	
AR(2) Black			-0.021 (-0.155 0.113)	
AR(3) Black			-0.148 (-0.282 -0.015)	
AR(1) Latine				-0.103 (-0.243 0.036)
AR(2) Latine				-0.042 (-0.185 0.101)
AR(3) Latine				-0.025 (-0.171 0.121)
Constant	-0.00003 (-0.005 0.005)	0.004 (0.001 0.007)	0.014 (0.003 0.024)	-0.003 (-0.011 0.005)
Observations	216	216	216	216
R <sup>2</sup>	0.139	0.101	0.100	0.108
Residual Std. Error (df = 201)	0.004	0.002	0.008	0.006

Note:

95% Confidence Intervals in parentheses

```
tsac1 <- ts_ar3_acute
tsac2 <- ts_ar3_white_acute
tsac3 <- ts_ar3_black_acute
tsac4 <- ts_ar3_latin_acute

stargazer(tsac1,tsac2,tsac3,tsac4,
  title = "Interrupted Time Series Models of Acute Mental Health Diagnoses, Minneapolis 2016-2020",
  covariate.labels = c("T",
    "Post-Killing", "T Post-Killing",
```

```

"COVID - State of Emerg.", "COVID - Stay at Home",
"MPD Use of Force t-1", "MPD Stops t-1",
"MPD OIS t-1",
"Mean Max. Temp.", "Snow (in.)", "Precip. (in.)",
"AR(1) Overall", "AR(2) Overall", "AR(3) Overall",
"AR(1) White", "AR(2) White", "AR(3) White",
"AR(1) Black", "AR(2) Black", "AR(3) Black",
"AR(1) Latine", "AR(2) Latine", "AR(3) Latine"),
dep.var.caption = "Acute MH Diagnoses/1,000",
dep.var.labels.include = FALSE,
column.labels = c("Overall", "White", "Black", "Latine"),
model.numbers = TRUE,
single.row = FALSE,
align = T,
omit.stat = c("adj.rsq", "f"),
font.size="footnotesize", no.space = T, column.sep.width = "1pt",
#star.cutoffs = c(.05, .01, .001), star.char = c("","**","***"),
report = "vcs",
ci=TRUE,
ci.level=0.95,
ci.separator = "|",
notes = "95\\% Confidence Intervals in parentheses",
header = F,
notes.append = F)

```

```

cm1 <- re_white_chronic
cm2 <- re_blk_chronic
cm3 <- re_latin_chronic
cm4 <- re_int_white_chronic
cm5 <- re_int_blk_chronic
cm6 <- re_int_latin_chronic

```

```

stargazer(cm1, cm2, cm3, cm4, cm5, cm6,
  title = "Interrupted Time Series RE Models of Chronic MH Diagnoses, Minneapolis 2016-2020",
  covariate.labels = c("T",
    "Post-Killing", "T Post-Killing",
    "COVID - State of Emerg.", "COVID - Stay at Home",
    "MPD Use of Force t-1", "MPD Stops t-1",
    "MPD OIS t-1",
    "Mean Max. Temp.", "Snow (in.)", "Precip. (in.)",
    "Conc. Disad.",
    "AR(1)-White", "AR(2)-White", "AR(3)-White",
    "AR(1)-Black", "AR(2)-Black", "AR(3)-Black",
    "AR(1)-Latine", "AR(2)-Latine", "AR(3)-Latine",
    "Post-KillingXConc.Disad."),
  dep.var.caption = "Chronic MH Diagnoses/1,000",
  dep.var.labels.include = FALSE,
  column.labels = c("White", "Black", "Latine",
    "White w/ Int.", "Black w/ Int.", "Latine w/ Int."),
  model.numbers = TRUE,
  single.row = FALSE,
  align = T,
  omit.stat = "adj.rsq",
  font.size="footnotesize",
  no.space = T,
  column.sep.width = "1pt",
  #star.cutoffs = c(.05, .01, .001), star.char = c("","**","***"),
  report = "vcs",
  ci=TRUE,
  ci.level=0.95,
  ci.separator = "|",

```

Table A12: Interrupted Time Series Models of Acute Mental Health Diagnoses, Minneapolis 2016-2020

	Acute MH Diagnoses/1,000			
	Overall	White	Black	Latine
	(1)	(2)	(3)	(4)
T	-0.00000 (-0.00002 0.00001)	0.00001 (-0.00000 0.00001)	0.00003 (-0.00000 0.00001)	0.00002 (-0.00003 0.00001)
Post-Killing	0.002 (-0.003 0.007)	-0.003 (-0.005 -0.0005)	-0.010 (-0.019 -0.002)	0.002 (-0.013 0.017)
T Post-Killing	-0.0002 (-0.0003 0.00003)	0.00000 (-0.0001 0.0001)	0.00002 (-0.0003 0.0003)	0.00004 (-0.0005 0.0001)
COVID - State of Emerg.	0.001 (-0.004 0.006)	0.004 (0.001 0.006)	0.012 (0.004 0.020)	-0.001 (-0.015 0.012)
COVID - Stay at Home	-0.003 (-0.008 0.002)	-0.005 (-0.007 -0.002)	-0.016 (-0.024 -0.008)	0.0004 (-0.014 0.015)
MPD Use of Force t-1	-0.001 (-0.013 0.010)	-0.004 (-0.009 0.002)	-0.012 (-0.032 0.007)	-0.018 (-0.051 0.015)
MPD Stops t-1	-0.001 (-0.003 0.001)	-0.001 (-0.002 0.0003)	-0.002 (-0.005 0.001)	0.0002 (-0.005 0.006)
MPD OIS t-1	-0.016 (-0.350 0.319)	0.092 (-0.067 0.251)	0.323 (-0.234 0.880)	-0.359 (-1.312 0.594)
Mean Max. Temp.	-0.00001 (-0.00004 0.00003)	-0.00001 (-0.00002 0.00001)	-0.00002 (-0.0001 0.00003)	0.00000 (-0.0001 0.0001)
Snow (in.)	-0.0003 (-0.002 0.001)	-0.001 (-0.001 0.0001)	-0.002 (-0.005 0.0004)	-0.001 (-0.005 0.003)
Precip. (in.)	0.001 (-0.005 0.006)	0.001 (-0.002 0.003)	0.003 (-0.006 0.011)	-0.001 (-0.016 0.013)
AR(1) Overall	-0.053 (-0.192 0.085)			
AR(2) Overall	0.052 (-0.088 0.192)			
AR(3) Overall	0.090 (-0.049 0.229)			
AR(1) White		0.019 (-0.115 0.152)		
AR(2) White		0.117 (-0.017 0.251)		
AR(3) White		-0.083 (-0.217 0.052)		
AR(1) Black			0.019 (-0.115 0.153)	
AR(2) Black			0.117 (-0.018 0.251)	
AR(3) Black			-0.082 (-0.217 0.053)	
AR(1) Latine				-0.125 (-0.264 0.015)
AR(2) Latine				-0.081 (-0.220 0.059)
AR(3) Latine				0.005 (-0.137 0.147)
Constant	0.010 (0.004 0.015)	0.002 (-0.001 0.004)	0.005 (-0.003 0.014)	0.003 (-0.011 0.018)
Observations	216	216	216	216
R <sup>2</sup>	0.066	0.266	0.265	0.035
Residual Std. Error (df = 201)	0.004	0.002	0.007	0.011

Note:

95% Confidence Intervals in parentheses

```

notes = "95\\% Confidence Intervals in parentheses",
header = F,
notes.append = F,
add.lines = list(c("Resid. Var.",
  round(attr(VarCorr(re_white_chronic), "sc")^2,2),
  round(attr(VarCorr(re_int_white_chronic), "sc")^2,2),
  round(attr(VarCorr(re_blk_chronic), "sc")^2,2),
  round(attr(VarCorr(re_int_blk_chronic), "sc")^2,2),
  round(attr(VarCorr(re_latine_chronic), "sc")^2,2),
  round(attr(VarCorr(re_int_latine_chronic), "sc")^2,2)),
  c("ZCTA Var.",
    round(var_re_white_chronic$zcta[1,1],2),
    round(var_re_int_white_chronic$zcta[1,1],2),
    round(var_re_black_chronic$zcta[1,1],2),
    round(var_re_int_black_chronic$zcta[1,1],2),
    round(var_re_latine_chronic$zcta[1,1],2),
    round(var_re_int_latine_chronic$zcta[1,1],2)),
  c("Post-Floyd Var.",
    round(var_re_white_chronic$zcta[2,2],2),
    round(var_re_int_white_chronic$zcta[2,2],2),
    round(var_re_black_chronic$zcta[2,2],2),
    round(var_re_int_black_chronic$zcta[2,2],2),
    round(var_re_latine_chronic$zcta[2,2],2),
    round(var_re_int_latine_chronic$zcta[2,2],2))))

```

```

acm1 <- re_white_acute
acm2 <- re_blk_acute
acm3 <- re_latine_acute
acm4 <- re_int_white_acute
acm5 <- re_int_blk_acute
acm6 <- re_int_latine_acute

```

```

stargazer(acm1, acm2, acm3, acm4, acm5, acm6,
  title = "Interrupted Time Series RE Models of Acute MH Diagnoses, Minneapolis 2016-2020",
  covariate.labels = c("T",
    "Post-Killing", "T Post-Killing",
    "COVID - State of Emerg.", "COVID - Stay at Home",
    "MPD Use of Force t-1", "MPD Stops t-1",
    "MPD OIS t-1",
    "Mean Max. Temp.", "Snow (in.)", "Precip. (in.)",
    "Conc. Disad.",
    "AR(1)-White", "AR(2)-White", "AR(3)-White",
    "AR(1)-Black", "AR(2)-Black", "AR(3)-Black",
    "AR(1)-Latine", "AR(2)-Latine", "AR(3)-Latine",
    "Post-KillingXConc.Disad."),
  dep.var.caption = "Acute MH Diagnoses/1,000",
  dep.var.labels.include = FALSE,
  column.labels = c("White", "Black", "Latine",
    "White w/ Int.", "Black w/ Int.", "Latine w/ Int."),
  model.numbers = TRUE,
  single.row = FALSE,
  align = T,
  omit.stat = "adj.rsq",
  font.size="footnotesize",
  no.space = T,
  column.sep.width = "1pt",
  #star.cutoffs = c(.05, .01, .001), star.char = c("","**","***"),
  report = "vcs",
  ci=TRUE,
  ci.level=0.95,
  ci.separator = "|",

```

Table A13: Interrupted Time Series RE Models of Chronic MH Diagnoses, Minneapolis 2016-2020

	Chronic MH Diagnoses/1,000					
	White	Black	Latine	White w/ Int.	Black w/ Int.	Latine w/ Int.
	(1)	(2)	(3)	(4)	(5)	(6)
T	0.00002 (-0.00000 0.00004)	0.0001 (-0.00002 0.0002)	0.00001 (-0.00001 0.00003)	0.00002 (-0.00000 0.00004)	0.0001 (-0.00002 0.0002)	0.00001 (-0.00001 0.00003)
Post-Killing	0.014 (-0.001 0.028)	-0.006 (-0.070 0.059)	-0.003 (-0.015 0.008)	0.014 (-0.001 0.028)	-0.006 (-0.070 0.059)	-0.003 (-0.015 0.008)
T Post-Killing	-0.001 (-0.001 -0.0004)	0.0003 (-0.002 0.002)	-0.0003 (-0.001 0.00004)	-0.001 (-0.001 -0.0004)	0.0003 (-0.002 0.002)	-0.0003 (-0.001 0.00004)
COVID - State of Emerg.	0.002 (-0.010 0.013)	-0.015 (-0.075 0.046)	0.010 (0.001 0.019)	0.002 (-0.010 0.013)	-0.015 (-0.075 0.046)	0.010 (0.001 0.019)
COVID - Stay at Home	-0.004 (-0.016 0.007)	0.009 (-0.054 0.072)	-0.007 (-0.016 0.003)	-0.004 (-0.016 0.007)	0.009 (-0.054 0.072)	-0.007 (-0.016 0.003)
MPD Use of Force t-1	-0.001 (-0.001 -0.0003)	-0.001 (-0.004 0.001)	-0.00002 (-0.001 0.001)	-0.001 (-0.001 -0.0003)	-0.001 (-0.004 0.001)	-0.00002 (-0.001 0.001)
MPD Stops t-1	-0.0001 (-0.0003 0.00001)	0.002 (0.001 0.003)	-0.00003 (-0.0002 0.0001)	-0.0001 (-0.0003 0.00001)	0.002 (0.001 0.003)	-0.00003 (-0.0002 0.0001)
MPD OIS t-1	-0.006 (-0.096 0.085)	-0.005 (-0.489 0.479)	-0.003 (-0.074 0.069)	-0.006 (-0.096 0.085)	-0.004 (-0.488 0.480)	-0.003 (-0.074 0.069)
Mean Max. Temp.	0.00003 (-0.00004 0.0001)	0.0002 (-0.0002 0.001)	0.00000 (-0.00005 0.0001)	0.00003 (-0.00004 0.0001)	0.0002 (-0.0002 0.001)	0.00000 (-0.00005 0.0001)
Snow (in.)	0.0002 (-0.003 0.004)	-0.003 (-0.021 0.014)	-0.001 (-0.004 0.001)	0.0002 (-0.003 0.004)	-0.003 (-0.021 0.014)	-0.001 (-0.004 0.001)
Precip. (in.)	-0.006 (-0.017 0.005)	-0.010 (-0.069 0.050)	0.002 (-0.007 0.011)	-0.006 (-0.017 0.005)	-0.010 (-0.069 0.050)	0.002 (-0.007 0.011)
Conc. Disad.	0.001 (-0.001 0.002)	-0.002 (-0.008 0.005)	0.0001 (-0.001 0.001)	0.0003 (-0.001 0.002)	-0.002 (-0.009 0.005)	0.0001 (-0.001 0.001)
AR(1)-White	-0.010 (-0.036 0.015)			-0.011 (-0.037 0.015)		
AR(2)-White	-0.006 (-0.032 0.020)			-0.006 (-0.032 0.020)		
AR(3)-White	-0.004 (-0.030 0.022)			-0.004 (-0.030 0.022)		
AR(1)-Black		-0.002 (-0.028 0.024)			-0.002 (-0.028 0.024)	
AR(2)-Black		-0.002 (-0.028 0.024)			-0.002 (-0.028 0.024)	
AR(3)-Black		-0.002 (-0.028 0.024)			-0.002 (-0.028 0.024)	
AR(1)-Latine			-0.004 (-0.030 0.023)			-0.004 (-0.030 0.023)
AR(2)-Latine			-0.004 (-0.030 0.023)			-0.004 (-0.030 0.023)
AR(3)-Latine			-0.004 (-0.030 0.023)			-0.004 (-0.030 0.023)
Post-KillingXConc.Disad.				-0.005 (-0.014 0.003)	0.004 (-0.015 0.023)	-0.0002 (-0.007 0.007)
Constant	0.0002 (-0.004 0.005)	-0.014 (-0.038 0.011)	-0.0004 (-0.004 0.003)	0.0003 (-0.004 0.005)	-0.014 (-0.038 0.011)	-0.0004 (-0.004 0.003)
Resid. Var.	0	0	0.06	0.06	0	0
ZCTA Var.	0	0	0	0	0	0
Post-Floyd Var.	0	0	0	0	0	0
Observations	5,720	5,720	5,516	5,720	5,720	5,516
Log Likelihood	9,589.304	62.823	10,558.660	9,585.481	59.183	10,553.960
Akaike Inf. Crit.	-19,138.610	-85.646	-21,077.320	-19,128.960	-76.366	-21,065.920
Bayesian Inf. Crit.	-19,005.570	47.388	-20,945.010	-18,989.280	63.321	-20,927.000

Note:

95% Confidence Intervals in parentheses

```

notes = "95\\% Confidence Intervals in parentheses",
header = F,
notes.append = F,
add.lines = list(c("Resid. Var.",
  round(attr(VarCorr(re_white_acute), "sc")^2,2),
  round(attr(VarCorr(re_int_white_acute), "sc")^2,2),
  round(attr(VarCorr(re_blk_acute), "sc")^2,2),
  round(attr(VarCorr(re_int_blk_acute), "sc")^2,2),
  round(attr(VarCorr(re_latin_acute), "sc")^2,2),
  round(attr(VarCorr(re_int_latin_acute), "sc")^2,2)),
  c("ZCTA Var.",
    round(var_re_white_acute$zcta[1,1],2),
    round(var_re_int_white_acute$zcta[1,1],2),
    round(var_re_black_acute$zcta[1,1],2),
    round(var_re_int_black_acute$zcta[1,1],2),
    round(var_re_latin_acute$zcta[1,1],2),
    round(var_re_int_latin_acute$zcta[1,1],2)),
  c("Post-Floyd Var.",
    round(var_re_white_acute$zcta[2,2],2),
    round(var_re_int_white_acute$zcta[2,2],2),
    round(var_re_black_acute$zcta[2,2],2),
    round(var_re_int_black_acute$zcta[2,2],2),
    round(var_re_latin_acute$zcta[2,2],2),
    round(var_re_int_latin_acute$zcta[2,2],2))))

```

## Rates of Hospitalization

```

roh <- panel %>%
  ungroup() %>%
  select(total_pop,
    Schizophrenia_tot, Depress_tot,
    bipolar_tot, othermood_tot, anxiety_tot,
    OCD_tot, trauma_tot, impulse_tot, personality_tot,
    eating_tot, somatic_tot, suicidal_tot,
    misc_tot, neuro_tot, etoh_tot, opioid_tot,
    weed_tot, sedative_tot, stimulant_tot, halluc_tot,
    inhal_tot, tobacco_tot, othersub_tot, disord_rem_tot) %>%
  summarize_all(sum) %>%
  mutate_at(vars(-c("total_pop")), ~(.x/total_pop)*1000) %>%
  select(-total_pop) %>%
  pivot_longer(everything(), names_to = "diagnosis", values_to = "rate") %>%
  mutate(rate = round(rate,3))

write_csv(roh, "Data/roh.csv")

```

Table A14: Interrupted Time Series RE Models of Acute MH Diagnoses, Minneapolis 2016-2020

	Acute MH Diagnoses/1,000					
	White	Black	Latine	White w/ Int.	Black w/ Int.	Latine w/ Int.
	(1)	(2)	(3)	(4)	(5)	(6)
T	0.00001 (-0.00001 0.00002)	0.00004 (0.00001 0.0001)	0.0001 (-0.00003 0.0002)	0.00000 (-0.00001 0.00002)	0.00004 (0.00001 0.0001)	0.0001 (-0.00003 0.0002)
Post-Killing	-0.006 (-0.018 0.006)	-0.019 (-0.035 -0.002)	0.002 (-0.075 0.080)	-0.006 (-0.018 0.006)	-0.018 (-0.034 -0.002)	0.002 (-0.075 0.080)
T Post-Killing	-0.00001 (-0.0004 0.0004)	0.0002 (-0.0003 0.001)	-0.0003 (-0.003 0.002)	-0.00001 (-0.0004 0.0004)	0.0002 (-0.0003 0.001)	-0.0003 (-0.003 0.002)
COVID - State of Emerg.	0.005 (-0.006 0.016)	0.015 (0.0005 0.030)	-0.013 (-0.087 0.060)	0.005 (-0.006 0.016)	0.015 (0.0005 0.030)	-0.013 (-0.087 0.060)
COVID - Stay at Home	0.011 (-0.0003 0.022)	-0.021 (-0.036 -0.005)	-0.003 (-0.079 0.072)	0.011 (-0.0003 0.022)	-0.021 (-0.036 -0.005)	-0.003 (-0.079 0.072)
MPD Use of Force t-1	-0.001 (-0.001 -0.0004)	-0.00001 (-0.001 0.001)	-0.001 (-0.005 0.004)	-0.001 (-0.001 -0.0004)	0.00001 (-0.001 0.001)	-0.001 (-0.005 0.004)
MPD Stops t-1	-0.0004 (-0.001 -0.0002)	-0.0001 (-0.0002 0.0001)	-0.0001 (-0.001 0.001)	-0.0004 (-0.001 -0.0002)	-0.0001 (-0.0003 0.0001)	-0.0001 (-0.001 0.001)
MPD OIS t-1	-0.002 (-0.089 0.085)	0.008 (-0.111 0.127)	-0.007 (-0.591 0.578)	-0.002 (-0.089 0.085)	-0.001 (-0.120 0.119)	-0.006 (-0.590 0.578)
Mean Max. Temp.	-0.00001 (-0.0001 0.0001)	-0.00002 (-0.0001 0.0001)	0.0001 (-0.0003 0.001)	-0.00001 (-0.0001 0.0001)	-0.00002 (-0.0001 0.0001)	0.0001 (-0.0003 0.001)
Snow (in.)	-0.001 (-0.004 0.003)	-0.001 (-0.006 0.003)	-0.002 (-0.023 0.020)	-0.001 (-0.004 0.003)	-0.001 (-0.006 0.003)	-0.002 (-0.023 0.020)
Precip. (in.)	-0.001 (-0.011 0.010)	0.003 (-0.012 0.017)	-0.031 (-0.104 0.042)	-0.001 (-0.011 0.010)	0.003 (-0.012 0.017)	-0.031 (-0.104 0.042)
Conc. Disad.	-0.002 (-0.004 0.001)	-0.0005 (-0.002 0.001)	-0.005 (-0.013 0.003)	-0.002 (-0.006 0.001)	-0.001 (-0.003 0.001)	-0.006 (-0.014 0.003)
AR(1)-White	-0.006 (-0.032 0.020)			-0.006 (-0.032 0.020)		
AR(2)-White	-0.006 (-0.032 0.020)			-0.006 (-0.032 0.020)		
AR(3)-White	-0.005 (-0.031 0.021)			-0.005 (-0.031 0.021)		
AR(1)-Black		0.003 (-0.023 0.029)			0.004 (-0.022 0.030)	
AR(2)-Black		-0.005 (-0.031 0.020)			-0.005 (-0.031 0.021)	
AR(3)-Black		0.012 (-0.014 0.038)			0.012 (-0.014 0.038)	
AR(1)-Latine			-0.001 (-0.027 0.026)			-0.001 (-0.027 0.025)
AR(2)-Latine			-0.001 (-0.027 0.025)			-0.001 (-0.028 0.025)
AR(3)-Latine			-0.001 (-0.027 0.025)			-0.001 (-0.027 0.025)
Post-KillingXConc.Disad.				0.001 (-0.003 0.005)	0.002 (-0.003 0.007)	0.003 (-0.020 0.026)
Constant	0.003 (-0.003 0.008)	-0.0004 (-0.006 0.006)	-0.007 (-0.038 0.023)	0.003 (-0.003 0.008)	-0.0003 (-0.006 0.006)	-0.007 (-0.038 0.023)
Resid. Var.	0	0	0	0	0.08	0.08
ZCTA Var.	0	0	0	0	0	0
Post-Floyd Var.	0	0	0	0	0	0
Observations	5,720	5,720	5,516	5,720	5,720	5,516
Log Likelihood	9,830.065	8,062.820	-959.972	9,824.930	8,060.995	-963.472
Akaike Inf. Crit.	-19,620.130	-16,085.640	1,959.945	-19,607.860	-16,079.990	1,968.944
Bayesian Inf. Crit.	-19,487.100	-15,952.610	2,092.253	-19,468.170	-15,940.300	2,107.868

Note:

95% Confidence Intervals in parentheses