

Supplementary Online Content

Nori-Sarma A, Sun S, Sun Y, et al. Association between ambient heat and risk of emergency department visits for mental health among US adults, 2010 to 2019. *JAMA Psychiatry*. Published online February 23, 2022. doi:10.1001/jamapsychiatry.2021.4369

eTable. CCS Codes and Corresponding ICD-9/ICD-10 Codes

eFigure 1. Time Course for Extreme Heat Exposure Response Curve

eFigure 2. Sensitivity Analysis Results and Time Course for Composite Mental Health End Point

eFigure 3. Time Course for Cause-Specific Mental Health Emergency Department Visits

eFigure 4. Incidence Rate Ratio of Emergency Department Visits for 95th Percentile of Temperature vs Optimal Temperature Among Subgroups, and Heterogeneity Tests

eAppendix. Sample R Code for Analysis

This supplementary material has been provided by the authors to give readers additional information about their work.

eTable: CCS Codes and Corresponding ICD 9 / ICD 10 codes

CCS Code	ICD9 Code	ICD10 Code
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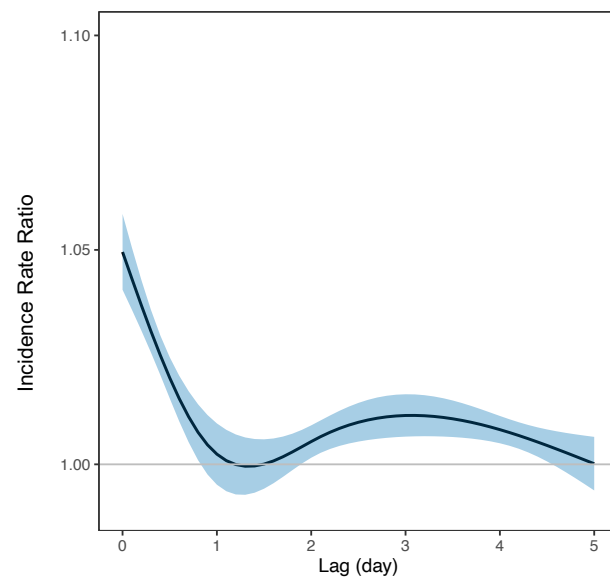
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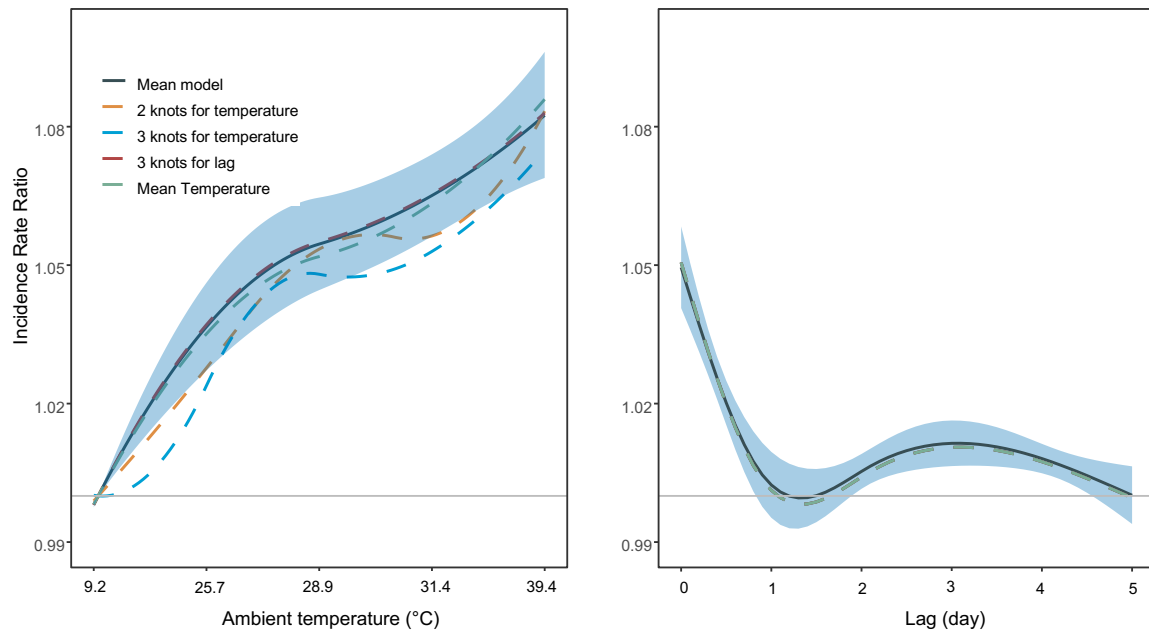
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670	29389 2939 30011 30012 30013 30014 30015 30016 30019 3006 3007 30081 30082 3021 3022 3023 3024 30250 30251 30252 30253 3026 30270 30271 30272 30273 30274 30275 30276 30279 30281 30282 30283 30284 30285 30289 3029 3060 3061 3062 3063 3064 30650 30651 30652 30653 30659 3066 3067 3068 3069 3071 30740 30741 30742 30743 30744 30745 30746 30747 30748 30749 30750 30751 30752 30753 30754 30759 30780 30781 30789 3101 316 64840 64841 64842 64843 64844 V402 V403 V4031 V4039 V409 V673	F061, F068, F440-F442, F444-F447, F4481, F4489, F449-F451, F4520-F4522, F4529, F4541, F4542, F458, F459, F481, F5000-F5002, F502, F508, F5081, F5082, F5089, F509, F5101-F5105, F5109, F5111-F5113, F5119, F513-F515, F518-F521, F5221, F5222, F5231, F5232, F524-F526, F528, F529, F53, F530, F531, F54, F59, F640, F641, F648-F654, F6550- F6552, F6581, F6589, F659, F66, F6810-F6813, F688, F68A, F99, O906, R37, R4589, Z87890, Z9183
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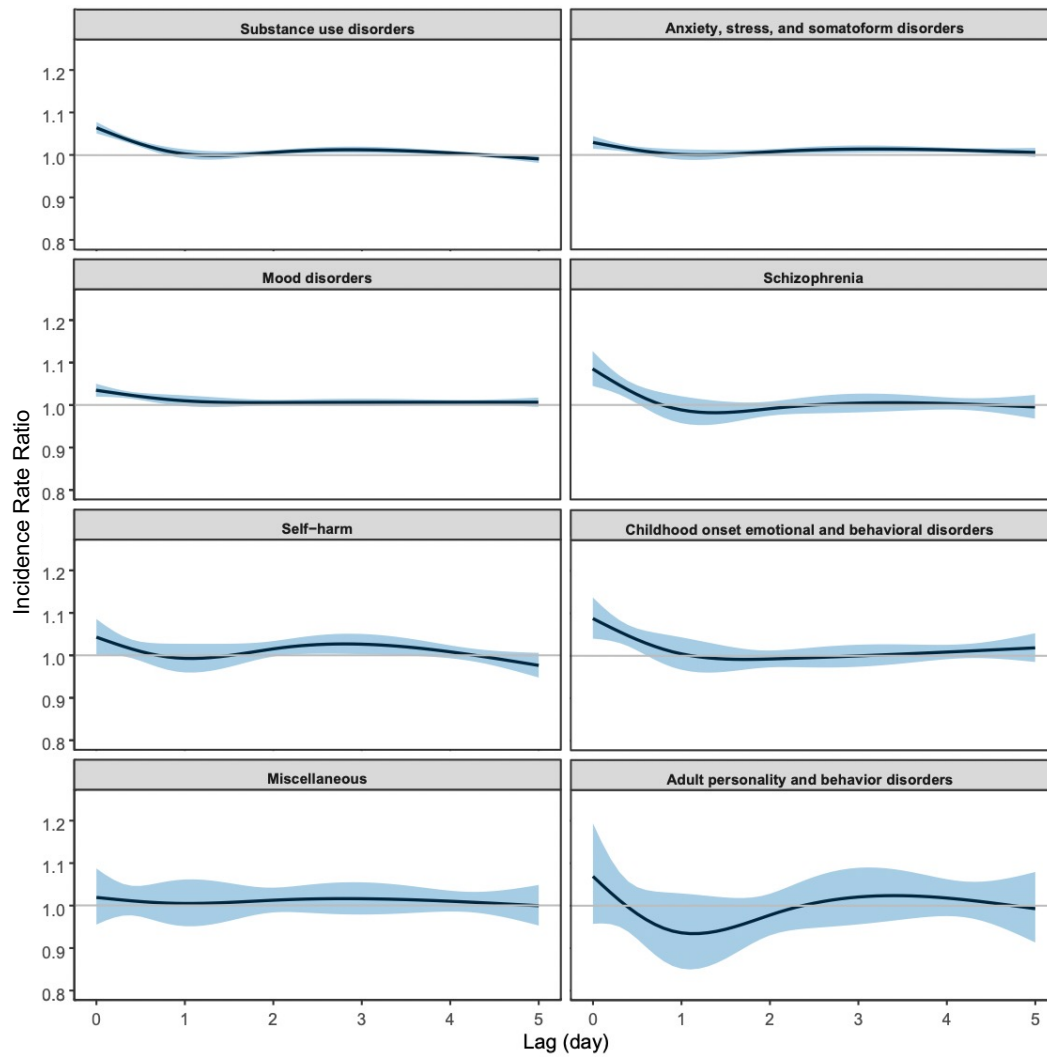
eFigure 1. Time Course for Extreme Heat Exposure Response Curve



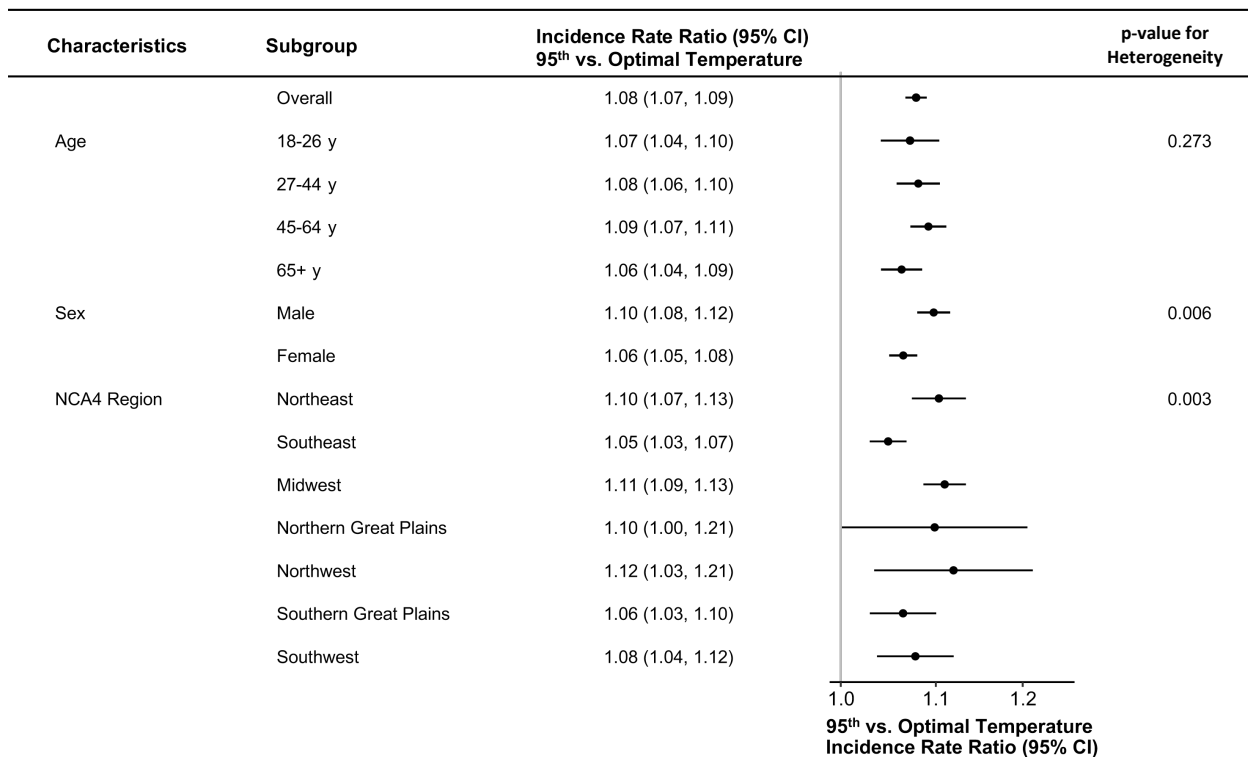
eFigure 2. Sensitivity Analysis Results and Time Course for Composite Mental Health End Point



eFigure 3. Time Course for Cause-Specific Mental Health Emergency Department Visits



eFigure 4. Incidence Rate Ratio of Emergency Department Visits for 95th Percentile of Temperature vs Optimal Temperature Among Subgroups, and Heterogeneity Tests



eAppendix. Sample R Code for Analysis

```
#####

# Sample R code for the analysis in:

# "Ambient heat and risk of emergency department visits for
# mental health among adults in the United States, 2010-2019"
# JAMA Psychiatry 2021

#####

library(tidyverse);library(readr);library(lubridate)

library(splines);library(dlnm);library(survival)

# function for dose-response curve

dset <- function(var, dis){

  dat <- claim2010_2019 %>% select(optum_lab_id, stay_start, county_fips,{{var}}) %>%
```

```

filter({{var}}==1) %>%
distinct(optum_lab_id, stay_start, .keep_all=TRUE) %>% ungroup() %>%
select(-optum_lab_id) %>%
group_by(stay_start, county_fips) %>% add_tally() %>%
distinct(stay_start, county_fips, n) %>% ungroup() %>%
mutate(strata=1:nrow(.))
# load('Z:\\darren\\heat_adults\\tmean.rda')

dat <- left_join(dat, data, by='stay_start')
dat <- left_join(dat, prism2010_2019, by=c('county_fips', 'control_date'))

dat <- dat %>% ungroup() %>% select(-c(county_fips, stay_start, Tmax_F, lag6, lag7))

basis <- crossbasis(dat[,c(6:11)], lag = 5, argvar = list(fun='bs', degree=2, knots=0.5),
  arglag = list(knots=logknots(5, 2)))

model <- clogit(case ~ basis + strata(strata)+ns(RHmean, 3)+holid, data=dat, weights = n,
  method = 'breslow')

perct <- seq(0.01, 0.99, by = 0.01)
pred <- crosspred(basis, model, cen=0.5, at= perct)
pmin <- perct[which.min(pred$allfit)]

pred <- crosspred(basis, model, cen=pmin, at=perct)

conc_dis <- rownames_to_column(data.frame(allRRfit=pred$allRRfit, allRRlow=pred$allRRlow,
  allRRhigh=pred$allRRhigh), var = 'conc') %>%
mutate(conc=as.numeric(conc))

```

```

pred <- crosspred(basis, model, cen=pmin, bylag=0.1,
  at=0.95)

lag_dis=as_tibble_col(pred$matRRfit[1,], column_name = 'matRRfit') %>%
  mutate(lagday=names(pred$matRRfit[1,]),lag=parse_number(lagday),
    matRRlow=as_tibble_col(pred$matRRlow[1,]) %>% pull(value),
    matRRhigh=as_tibble_col(pred$matRRhigh[1,]) %>% pull(value))
save(lag_dis, file = paste0(dis,'.rda'))
save(conc_dis, file = paste0(dis,'.rda'))
}

dset(mental,'mental')

#-----
# Function for relative risk
relatrisk <- function(var, num){
  dat <- claim2010_2019 %>% select(optum_lab_id, stay_start, county_fips,{{var}}) %>%
    filter({{var}}==num) %>%
    distinct(optum_lab_id, stay_start, .keep_all=TRUE) %>% ungroup() %>%
    select(-optum_lab_id) %>%
    group_by(stay_start, county_fips) %>% add_tally() %>%
    distinct(stay_start, county_fips, n) %>% ungroup() %>%
    mutate(strata=1:nrow(.))

  fips <- dat %>% distinct(county_fips) %>% pull(county_fips)
  prism <- prism2010_2019 %>% filter(county_fips %in% fips) %>%
    select(county_fips, Tmax_F)
  dlist <- lapply(fips, function(x) prism[prism$county_fips==x,])

```

```

names(dlist) <- fips
predper <- c(seq(1,99, by=0.1))
tmean <- rowMeans(sapply(dlist, function(x) quantile(x$Tmax_F, predper/100,na.rm = T)),
  na.rm = T)

dat <- left_join(dat, data, by='stay_start')
dat <- left_join(dat, prism2010_2019, by=c('county_fips', 'control_date'))

dat <- dat %>% ungroup() %>% select(-c(county_fips, stay_start, Tmax_F,lag6,lag7))

basis <- crossbasis(dat[,c(6:11)],lag = 5, argvar = list(fun='bs',degree=2, knots=0.5),
  arglag = list(knots=logknots(5, 2)))

model <- clogit(case ~ basis + strata(strata)+ns(RHmean, 3)+holid, data=dat, weights = n,
  method = 'breslow')

perct <- seq(0.01, 0.99, by = 0.01)
pred <- crosspred(basis, model, cen=0.5, at= perct)
pmin <- perct[which.min(pred$allfit)]

pmin_value <- round(((tmean[paste0(pmin*100, '.0%')]-32)*5/9,1)

extheat <- round(((tmean['95.0%']-32)*5/9,1)
pred <- crosspred(basis, model, cen=pmin, at=c(0.85,0.95))

c(length(fips),pmin, pmin_value,
extheat,pred$allfit[2],pred$allse[2],pred$allRRfit[2],pred$allRRlow[2],
  pred$allRRhigh[2])

```

}

Relatrisk(mental,1)