Replication README file for Temperature and Child Maltreatment by Mary F. Evans, Ludovica Gazze, and Jessamyn Schaller

Overview

The replication package includes Stata do files and data files as well as R scripts to generate the figures and tables that appear in the paper and online appendices. The package also includes output files for results reported in the paper and online appendix. The Stata code was run on a server using Stata/MP 18.0 for Windows (64-bit x86-64). R scripts were run on a server using RStudio Server (version 4.3.2).

Data Availability

The following data files are required for the analysis and are provided in the Data folder unless otherwise indicated. Some data **cannot be made** publicly available.

Data file	Source	Notes	Provided
`data/raw/CF2006v5.dta`	NDACAN	Confidential	No
`data/raw/CF2007v6.dta`	NDACAN	Confidential	No
`data/raw/CF2008v5.dta`	NDACAN	Confidential	No
`data/raw/CF2009v6.dta`	NDACAN	Confidential	No
`data/raw/CF2010v5.dta`	NDACAN	Confidential	No
`data/raw/CF2011v5.dta`	NDACAN	Confidential	No
`data/raw/CF2012v5.dta`	NDACAN	Confidential	No
`data/raw/CF2013v5.dta`	NDACAN	Confidential	No
`data/raw/CF2014v4.dta`	NDACAN	Confidential	No
`data/raw/CF2015v4.dta`	NDACAN	Confidential	No
`data/raw/CF2016v3.dta`	NDACAN	Confidential	No
`data/raw/CF2017v1.dta`	NDACAN	Confidential	No
`data/raw/CF2018v2.dta`	NDACAN	Confidential	No

data/raw/ac_fips_year.dta	Park et al. (2020)	Unknown	No
data/raw/seer/seer_cm_cty.dta	SEER	Publicly available	Yes
data/raw/saipe/saipe_cty.dta	SAIPE	Publicly available	Yes
data/raw/bls_urate/bls_urate.dta	BLS	Publicly available	Yes
data/raw/PctUrbanRural_County.xlsx	Census	Publicly available	Yes
data/raw/climate_zones.csv	https://gist.github.com/philngo/d3e251040569dba67942	Publicly available	Yes
data/raw/State reporting to NCANDS by year.xlsx	NDACAN	Publicly available	Yes
data/raw/atus/atus_ipumsraw.dta	IPUMS	Publicly available	Yes
data/raw/LaborForce_2000-2016.xlsx	Bureau of Labor Statistics	Publicly available	Yes
data/raw/ Underlying Cause of Death, 1999-2019.txt"	Centers for Disease Control and Prevention	Publicly available	Yes
data/raw/CDCopioidFIPS.dta	Centers for Disease Control and Prevention	Publicly available	Yes
data/raw/tl_2010_us_county10.shp	Census TIGER/Line	Publicly available	Yes
data/raw/usgrid_data_2000/geotiff/uspop00.tif	US Census	Publicly available	Yes
data/derived/NCANDS_balanced_panel.dta	NDACAN	Derived	Yes
data/raw/start05/pptyyyymmdd.zip	PRISM	Publicly available	No

data/raw/start05/tmaxyyyymmdd.zip	PRISM	Publicly available	No
data/raw/start05/tminyyyymmdd.zip	PRISM	Publicly available	No
data/raw/historical/zipped/tmaxyyyymmdd.zip	PRISM	Publicly available	No
data/raw/CMIP6/daily/.	COPERNICUS	Publicly available	No
data/raw/CMIP6/historical/daily/.	COPERNICUS	Publicly available	No
data/raw/CMIP6/midcentury/daily/.	COPERNICUS	Publicly available	No

Notes on data availability:

data/raw/CF2006v5.dta - data/raw/CF2018v2.dta
The National Child Abuse and Neglect Data Systems (NCANDS) Child Files for FFY 2006-2018 were obtained through a restricted data agreement with the National Data Archive on Child Abuse and Neglect (NDACAN). For each file, the version is provided at the end of the filename above. Members of the research community can apply for access to the NCANDS Child Files by following the procedures outlined here: https://www.ndacan.acf.hhs.gov/datasets/request-restricted-data.cfm

data/raw/PctUrbanRural_County.xlsx
Used to calculate rurality by county. Accessed on July 1, 2024 from https://www.census.gov/programs-surveys/geography/technical-documentation/records-layout/2010-urban-lists-record-layout.html

data/raw/State reporting to NCANDS by year.xlsx
Researcher-generated dataset based on information from the National Data Archive on Child Abuse and Neglect (NDACAN).

data/raw/climate_zones.csv
Climate zones by county from https://gist.github.com/philngo/d3e251040569dba67942. Accessed March 8, 2024.

data/raw/ac_fips_year.dta

Residential air conditioning penetration by county and year from Park et al. (2020). See discussion on their p. 314 and footnote 11 for details. We received these data from Jisung Park via email on 11/2/2022.

`data/raw/atus_ipumsraw.dta`
IPUMS Time Use samples 2003-2022 from https://www.atusdata.org/atus/. Extract created Feb 07, 2024.

`data/raw/tl_2010_us_county10.shp`
US Census TIGER/Line county shapefiles (2010 boundaries) used to assign weather data to counties. Downloaded on May 25, 2022.

`data/raw/usgrid_data_2000/geotiff/uspop00.tif`
US Census gridded population data used to weight gridded weather data to assign to counties. Downloaded on December 19, 2023.

`data/derived/NCANDS_balanced_panel.dta`
This data file is required for all maltreatment results reported in the paper and is produced using the procedure described below. We received permission to make these aggregate data publicly available from NDACAN.

`data/raw/start05/pptyyyymmdd.zip data/raw/start05/tmaxyyyymmdd.zip data/raw/start05/tminyyyymmdd.zip where yyyymmdd goes from 20050101 to 20151231`
These data files are downloaded from the PRISM ftp in the code provided. We do not provide them directly in the replication package due to their large size.

`data/raw/historical/zipped/tmaxyyyymmdd.zip where yyyymmdd goes from 19810101 to 20011231`
These data files are downloaded from the PRISM ftp in the code provided. We do not provide them directly in the replication package due to their large size.

`data/raw/CMIP6/daily/. data/raw/CMIP6/historical/daily/. data/raw/CMIP6/midcentury/daily/.`
These data files are downloaded from the COPERNICUS API in the code provided. They include data projections in .nc format. File names reflect relevant dates and the underlying climate model. We do not provide them directly in the replication package due to their large size.

Computational requirements

The R scripts were run on RStudio Server hosted by NBER, version 4.3.2. Approximate run times provided below.

Stata code was run with Stata/MP version 18.0. Approximate run times provided below.

The Stata code was last run on a Windows 11 Enterprise desktop computer with 64-bit operating system; installed RAM: 32.0 GB; processor: Intel(R) Core(TM) i9-10900 CPU @ 2.80GHz 2.81 GHz.

Description of programs/code

Programs in `replication/code` prepare the data and generate tables and figures in the paper and appendices.

Instructions to Replicators

Install 5 Stata packages using the following code:

```
maptile_install using "http://files.michaelstepner.com/geo_county2014.zip"
ssc install binscatterhist
ssc install addplot
ssc install ftools
ssc install gtools
```

Install the following R packages using the following code:

```
install.packages('raster')
install.packages('sp')
install.packages('sf')
install.packages('data.table')
install.packages('reshape2')
install.packages('lubridate')
```

```
install.packages('dplyr')

install.packages('maptools')

install.packages('rgeos')

install.packages('rgdal')

install.packages('exactextractr')

install.packages('ncdf4')

install.packages('ncdf4.helpers')

install.packages('ecmwfr')

install.packages('chillR')

install.packages('akima')
```

Run the following code files in the order that appears below to create the data files necessary for the analysis. You will likely need to confirm the correct paths for some files given constraints on file sizes imposed by Dataverse.

- Run `code/ncands_panel.do`
  - Run time: 30 minutes
- Run `code/controls.do`
  - Run time: <1 minute
- Create folder `data/raw/start05` and `data/unzipped` and `data/temp` and run `code/link_prism_ctypop_2005_2017.R`
  - Run time: a few days.
- Run `code/clean_PRISM_RESTAT.do`
  - Run time: <2 hours
- Run `code/link_prism_cty.R`
  - Run time: a few days
- Run `code/append_PRISM_balancedcounty_bycal_spatavg.do`
  - Run time: <2 hours
- Create folder `data/raw/historical/zipped` and `data/raw/historical/unzipped` and run `code/link_prism_historical_spatavgpop.R`

    - Run time: a few days
- Create folder `data/raw/CMIP6/historical/daily and data/raw/CMIP6/historical/daily/processed and run code/link_cmip6_Nspatavgpop_hist.R.` This code requires a user name and key obtained through registering with the COPERNICUS API. Instructions are under details at this page https://search.r-project.org/CRAN/refmans/chillR/html/download_cmip6_ecmwfr.html
    - Run time: a few days
- Create folder `data/raw/CMIP6/daily and data/raw/CMIP6/daily/processed and run code/ link_cmip6_Nspatavgpop.R.` This code requires a user name and key obtained through registering with the COPERNICUS API. Instructions are under details at this page https://search.r-project.org/CRAN/refmans/chillR/html/download_cmip6_ecmwfr.html
    - Run time: a few days
- Run `code/merge_cmip6_spatavgN.do`
    - Run time: <2 hours
- Create folder `data/raw/CMIP6/midcentury/daily and data/raw/CMIP6/midcentury/daily/processed and run code/ link_cmip6_Nspatavgpop.R.` This code requires a user name and key obtained through registering with the COPERNICUS API. Instructions are under details at this page https://search.r-project.org/CRAN/refmans/chillR/html/download_cmip6_ecmwfr.html
    - Run time: a few days
- Run `code/merge_cmip6_spatavgN_midcentury.do`
    - Run time: <2 hours

Then, run the following do files to produce all of the tables and figures that appear in the paper and online appendices.

- Run `code/main_results.do` to produce all figures and tables in the paper and appendix except Figures 3, 4, A6, A11, A12 and A13.
    - Run time: <1 minute
- Run `code/ac_figures_3_and_A11.do` to produce Figure 3 and Appendix Figure A11.
    - Run time: <1 minute
- Run `code/robustness_figure_A6.do` to produce Appendix Figure A6.
    - Run time: <1 minute
- Run `code/atus_figure_A12.do` to produce appendix Figure A12.
    - Run time: <1 minute

- Run `code/climate_projections_figures_4_and_A13a.do` to produce Figure 4 in the paper and Figure A13a in the appendix.
    - Run time: 56 minutes
- Run `code/climate_projections_figure_A13b.do` to produce Figure A13b in the appendix. Must run `code/climate_projections_figures_4_and_A13a.do` before running this file.
    - Run time: 34 minutes

List of tables and programs

Figure/table output file name	**As appears in paper/appendix**	**Code to produce**
allegations_4_per_ctybiweek_date_styear_2wks	Figure 1, panel (a)	`main_results.do`
victims_4_per_ctybiweek_date_styear_2wks	Figure 1, panel (b)	`main_results.do`
subr_4_per_ctybiweek_date_styear_2wks	Figure 1, panel (c)	`main_results.do`
fostercr_4_per_ctybiweek_date_styear_2wks	Figure 1, panel (d)	`main_results.do`
sub_physical_4_per_ctybiweek_date_styear_2wks_Conly	Figure 2, panel (a)	`main_results.do`
sub_neglect_4_per_ctybiweek_date_styear_2wks_Conly	Figure 2, panel (b)	`main_results.do`
sub_sexual_4_per_ctybiweek_date_styear_2wks_Conly	Figure 2, panel (c)	`main_results.do`
sub_emotion_4_per_ctybiweek_date_styear_2wks_Conly	Figure 2, panel (d)	`main_results.do`
victims_4_per_ctybiweek_date_styear_2wks_by_Income_acterciles	Figure 3, panel (a)	`ac_figures_3_and_A11.do`
victims_4_per_ctybiweek_date_styear_2wks_by_Urban_acterciles	Figure 3, panel (b)	`ac_figures_3_and_A11.do`

effects_climate	Figure 4	climate_projections_figures_4_and_A13a.do
map_median_allegations4	Figure A1	main_results.do
map_median_victims4	Figure A2	main_results.do
monthly_means	Figure A3, panel (a)	main_results.do
yearly_means	Figure A3, panel (b)	main_results.do
map_temp_avgyearlyN35	Figure A4	main_results.do
allegations_4_per_ctybiweek_date_styear_2wks_Conly_10degbins	Figure A5, panel (a)	main_results.do
allegations_4_per_ctybiweek_date_styear_2wks_Conly_3degbins	Figure A5, panel (b)	main_results.do
victims _4_per_ctybiweek_date_styear_2wks_Conly_10degbins	Figure A5, panel (c)	main_results.do
victims_4_per_ctybiweek_date_styear_2wks_Conly_3degbins	Figure A5, panel (d)	main_results.do
allegations_4_per_ctybiweek_date_styear_2wks_Conly_spatavg	Figure A6, panel (a)	Main.do or robustness_figure_A6.do
victims_4_per_ctybiweek_date_styear_2wks_Conly_spatavg	Figure A6, panel (b)	Main or robustness_figure_A6.do
victims_4_per_ctybiweek_date_styear_2wks_Conly_zone2	Figure A7, panel (a)	main_results.do
victims_4_per_ctybiweek_date_styear_2wks_Conly_zone3	Figure A7, panel (b)	main_results.do
victims_4_per_ctybiweek_date_styear_2wks_Conly_zone4	Figure A7, panel (c)	main_results.do
victims_4_per_ctybiweek_date_styear_2wks_Conly_zone5	Figure A7, panel (d)	main_results.do
alleg_prof_4_per_ctybiweek_date_styear_2wks_Conly	Figure A8, panel (a)	main_results.do

sub_prof_4_per_ctybiweek_date_styear_2wks_Conly	Figure A8, panel (b)	main_results.do
alleg_nonprof_4_per_ctybiweek_date_styear_2wks_Conly	Figure A8, panel (c)	main_results.do
sub_nonprof_4_per_ctybiweek_date_styear_2wks_Conly	Figure A8, panel (d)	main_results.do
alleg_physical_4_per_ctybiweek_date_styear_2wks_Conly	Figure A9, panel (a)	main_results.do
alleg_neglect_4_per_ctybiweek_date_styear_2wks_Conly	Figure A9, panel (b)	main_results.do
alleg_sexual_4_per_ctybiweek_date_styear_2wks_Conly	Figure A9, panel (c)	main_results.do
alleg_emotion_4_per_ctybiweek_date_styear_2wks_Conly	Figure A9, panel (d)	main_results.do
allegations_prior_4_per_ctybiweek_date_styear_2wks_Conly	Figure A10, panel (a)	main_results.do
victims_prior_4_per_ctybiweek_date_styear_2wks_Conly	Figure A10, panel (b)	main_results.do
allegations_new_4_per_ctybiweek_date_styear_2wks_Conly	Figure A10, panel (c)	main_results.do
victims_new_4_per_ctybiweek_date_styear_2wks_Conly	Figure A10, panel (d)	main_results.do
allegations_4_per_ctybiweek_date_styear_2wks_by_Income_acterciles	Figure 11, panel (a)	ac_figures_3_and_A11.do
allegations_4_per_ctybiweek_date_styear_2wks_by_Urban_acterciles	Figure 11, panel (a)	ac_figures_3_and_A11.do
graph_activities	Figure A12, panel (a)	atus_figure_A12.do
graph_childcare	Figure A12, panel (b)	atus_figure_A12.do
effects_climate_insample	Figure A13, panel (a)	climate_projections_figures_4_and_A13a.do

effects_climate_midcentury	Figure A13, panel (b)	`climate_projections_figure_A13b.do`
Main log file	Table 1	`main_results.do`
Main log file	Table A1	`main_results.do`
Main log file	Table A2	`main_results.do`

The provided code reproduces all tables and figures in the paper and appendix.

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