Supplementary information

All-cause and cause-specific mortality associated with daylight saving time transition in the United States: A nationwide time series study based on weekly data

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S1 Data and variables

S1.1 Mortality data

We retrieved state-specific weekly death counts from the National Center for Health Statistics (HCHS) database of the Centers for Disease Control and Prevention (CDC) of the US (website link: https://data.cdc.gov/) [1]. We obtained the weekly death counts in the period from the start of 2015 to the end of 2019 containing aggregated death counts of all US jurisdictions based on death certificates for US residents. The state-specific mortality data were stratified according to different epidemiological weeks, states in the US, age, and ethnicity groups. The underlying causes of death were identified according to the International Statistical Classification of Diseases and Related Health Problems, the tenth revision (ICD-10) [2]. We excluded the data in 2020 or after, so that the impacts of COVID-19 pandemic could be neglected in this study.

The mortality data were the outcome variable in this study.

S1.2 Population data

The state-specific population data for each year between 2014 to 2020 were obtained via the US Census Bureau (website link: https://data.census.gov) [3]. The state-specific population data were stratified according to different age, and ethnicity groups. To match with the same temporal resolution of weekly mortality data, linear interpolation was employed to calculate the mid-epidemiological-week population size for each state, and each subgroup of population. We remarked that since there was no dramatic change observed in population size between and within years, the imprecision from linear interpolation may have little influenced the results.

The data of population size were used as an offset to estimate mortality rate in regression models.

S1.3 Meteorological and pollution data

The state-specific daily meteorological and pollution data were obtained from US Environmental Protection Agency's (EPA) Air Quality System (AQS) [4]. The variables including daily mean temperature (degree Celsius), relative humidity (%), and wind speed (meter per second) for meteorological data, and fine suspended particulates (i.e., particles with an aerodynamic diameter of ≤ 2.5 μm, PM2.5, μg per cubic meter), and ozone concentration for pollution data. All these daily data were used to calculate the weekly average value to match the same temporal resolution of weekly mortality data.

The meteorological and pollution data were considered as confounding variables that needed to be adjusted in regression models.

S1.4 Daylight saving time (DST) in the US

The Daylight saving time (DST) was the variable of interests in this study.

DST in the US was implemented in 48 states and the District of Columbia (DC) except for Arizona and Hawaii states. The starting dates of spring or fall DST were the second Sunday of March and the first Sunday of November, respectively, which varied from 2015 to 2019 as follows.

- In 2015,
  - spring DST started on March 8 (Sunday of the 10-th epidemiological week), and
  - fall DST started on November 1 (Sunday of the 44-th epidemiological week).
- In 2016,
  - spring DST started on March 13 (Sunday of the 11-th epidemiological week), and
  - fall DST started on November 6 (Sunday of the 45-th epidemiological week).
- In 2017,
  - spring DST started on March 12 (Sunday of the 11-th epidemiological week), and
  - fall DST started on November 5 (Sunday of the 45-th epidemiological week).
- In 2018,
  - spring DST started on March 11 (Sunday of the 11-th epidemiological week), and
  - fall DST started on November 4 (Sunday of the 45-th epidemiological week).
- In 2019,

- spring DST started on March 10 (Sunday of the 11-th epidemiological week), and
- fall DST started on November 3 (Sunday of the 45-th epidemiological week).

Although DST was not applicable in the most of regions in Arizona state and Hawaii state, we still included these two states in the analysis for the completeness of the national-level data of the US.

S2 Technical details of statistical analyses

All statistical analyses were carried out using **R** statistical software, version 4.2.1 (R Foundation, Vienna, Austria) [5].

S2.1 Regression model and likelihood framework

The analysis of counts data was usually performed by using Poisson, quasi-Poisson, or negative binomial (NB) regression models. Among them, quasi-Poisson and NB regression models were almost equivalent in their statistical performance of parameter estimating, and commonly adopted to account for the over-dispersion feature of counts data [6]. Besides, NB models outperformed for providing a full likelihood framework against the quasi-likelihood framework of quasi-Poisson models, which benefited the downstream model selection procedure relying on the likelihood profile.

As such, in this study, weekly death counts for a given epidemiological week *t*, region, cause of death, and subgroup of population, were analysed using NB log-linear regression model as follows.

$$\left(y_t \middle| \boldsymbol{X}_t^{\mathrm{T}}\right) \sim \mathrm{NB}\left(\mathrm{mean} = \exp\left(\boldsymbol{X}_t^{\mathrm{T}}\boldsymbol{\beta}\right) \times \mathrm{population}_t, \mathrm{dispersion} = k\right),$$

where

- y_t denoted the observed death counts in the *t*-th week;
- $\boldsymbol{X}_t^{\mathrm{T}}$ denoted the observed transpose (i.e., the superscript "T" here) of covariables' vector in the *t*-th week;
- $\boldsymbol{\beta}$ denoted the vector of regression coefficients to be estimated;
- k denoted the dispersion parameter of NB distribution used to govern the distribution of death counts, such that the variance of $\left(y_t \middle| \boldsymbol{X}_t^{\mathrm{T}}\right)$ was $\exp(\boldsymbol{X}_t^{\mathrm{T}}\boldsymbol{\beta}) \cdot \left[1 + \frac{\exp(\boldsymbol{X}_t^{\mathrm{T}}\boldsymbol{\beta})}{k}\right]$, and specially, NB distribution would converge to Poisson distribution when k became extremely large [7];
- $\mathrm{population}_t$ denoted the observed (or interpolated) population size at the middle of the *t*-th week, which was included as an offset in the model to adjust for the population size, such that the regression coefficients may be treated as effects sizes regarding mortality rate (instead of death counts).

The NB distribution in the equation above was considered as the likelihood function that was used to measure the goodness-of-fit between the fitted and observed death counts.

For the composition of regressors (i.e., $\boldsymbol{X}_t$), we considered the long-term temporal trends, (within-year) seasonality, weeks following DST transitions (which is the variable of interests), meteorological variables, and pollutants as follows.

$$\boldsymbol{X}_t^{\mathrm{T}}\boldsymbol{\beta} = \alpha_1 t + \alpha_2 \mathrm{ps}(t, \mathrm{df} = 3) + \sum_{i=0}^{7} \beta_i \mathrm{DST}_{i,t}^{\mathrm{spring}} + \sum_{i=0}^{7} \gamma_i \mathrm{DST}_{i,t}^{\mathrm{fall}} + \alpha_3 \mathrm{ns}(\mathrm{temp}_t, \mathrm{df} = 3) + \alpha_4 \mathrm{ns}(\mathrm{RH}_t, \mathrm{df} = 3) + \alpha_5 \mathrm{ns}(\mathrm{wind}_t, \mathrm{df} = 2) + \alpha_6 \mathrm{PM}_t + \alpha_7 \mathrm{ozone}_t + \alpha_8 \mathrm{isHoliday}_t.$$

Here,

- t denoted the calendar date of the *t*-th week's middle point, which was included in the model to account for the long-term temporal trends;
- ps() denoted the periodic spline function used to govern the seasonality, where "df" was the degree of freedom selected using AIC score (which will be introduced in the model selection section), and the periodicity is fixed to be 1 year;
- $\mathrm{DST}_{i,t}^{\mathrm{spring}}$ denoted the dummy variable of the *i*-th weeks following spring DST transition, where a total of 8 weeks (i.e., i ranged from 0 to 7) consecutive to DST transition dates were considered in this study;
- $\mathrm{DST}_{i,t}^{\mathrm{fall}}$ denoted the dummy variable of the *i*-th weeks following fall DST transition;
- temp_t denoted the weekly average mean temperature (degree Celsius) in the *t*-th week, and ns() denoted the natural spline function used to capture the nonlinear associations;
- RH_t denoted the weekly average relative humidity (%) in the *t*-th week;
- wind_t denoted the weekly average wind speed (metre per second) in the *t*-th week;
- PM_t denoted the weekly fine suspended particulates concentration (i.e., PM2.5) in the *t*-th week;

- ozone_t denoted the weekly ozone concentration in the *t*-th week;
- isHoliday_t denoted the variable that took a value between 0 and 1 for the proportion of public holidays in the *t*-th weeks;
- all regression coefficients were denoted by either α, β, or γ.

S2.2 Model selection, fitting procedure, and parameter estimation

Using the pre-defined NB-distributed likelihood framework, Akaike information criterion (AIC) score was calculated, and considered as a measure of the trade-off between goodness-of-fit and model complexity, which was used as a criterion for model section regarding different values of degrees of freedom (df) in the NB regression models. As such, the optimal value of df across a wide range from 1 to 12 was selected according to the smallest value of AIC score. After the AIC-based model selection procedure, we reported that for all-cause mortality data of the whole population in the US, the optimal choice of df was df = 3 for the seasonality term, df = 2 for the nonlinear effect of temperature, df = 3 for the nonlinear effect of relative humidity, and df = 2 for the nonlinear effect of wind speed, which were already shown in the aforementioned regression equation.

Although the optimal combination of the df above was selected for all-cause mortality data of the whole population in the US, we consistently use the same setting for different US regions and subgroups of population. We noted that the selected degree of freedom (df) here merely fixed the number of free parameters (that were to be estimated) to capture the seasonality patterns and nonlinear associations, rather than to represent the exact shape of seasonality or nonlinear associations themselves, which means different values of parameters were estimated for different US regions and subgroups of population. Thus, different (or separated) NB regression models were fitted for different US regions and subgroups of population.

The association between the weeks following DST transitions was measured by mortality rate ratio (RR), which was calculated as the exponent of regression coefficients of DST terms (i.e., $\exp(\beta)$, and $\exp(\gamma)$). We estimated both crude and adjusted RR (i.e., cRR and aRR) by using the crude model and full (or fully adjusted) model, respectively. Here, the crude model was the full regression model without any meteorological variable or pollutant (i.e., exclude terms from α_3 to α_7), which was formulated as below.

$$\boldsymbol{X}_t^{\mathrm{T}}\boldsymbol{\beta} = \alpha_1 t + \alpha_2 \mathrm{ps}(t, \mathrm{df}=3) + \sum_{i=0}^{7}\beta_i \mathrm{DST}_{i,t}^{\mathrm{spring}} + \sum_{i=0}^{7}\gamma_i \mathrm{DST}_{i,t}^{\mathrm{fall}} + \alpha_8 \mathrm{isHoliday}_t.$$

For the estimation of regression parameters, denoted as vector $\boldsymbol{\beta}$, we considered the maximum likelihood estimator (MLE) $\widehat{\boldsymbol{\beta}} \sim \mathrm{MultivariateNormal}(\text{mean vector} = \boldsymbol{\beta}, \text{covariance matrix} = \boldsymbol{\Sigma})$. Here, $\widehat{\boldsymbol{\beta}}$ was an asymptotically normal statistical estimator of the true regression parameters' vector $\boldsymbol{\beta}$. The $\boldsymbol{\Sigma}$ denoted the covariance matrix of all regression parameters, which was estimated by the Delta method with first-order Taylor's approximation [8], and used for constructing the 95% CIs. To assess the statistical uncertainty of parameter estimates, the 95% confidence interval (CI) was constructed by mean estimate ± 1.96 standard error (SE), where SE was directly calculated from the covariance matrix $\boldsymbol{\Sigma}$. The adjusted *p*-value was calculated from the two-tailed Wald's test [9], with the adjustment of Benjamini-Hochberg (BH) procedure for controlling the false discovery rate (FDR) [10]. Statistical significance was claimed when the adjusted *p*-value was less than 0.05.

S2.2.1 Pooled effect size of DST transition

Besides summary the rate ratio (RR) for each week after DST transition (i.e., from 0 to 7 weeks), we pooled all 8 week-specific RR estimates as an average RR for the average effect size of 0-7 weeks after DST transition. By using spring DST as an example, the pooled RR was calculated as $\bar{\beta} = \frac{\sum_{i=0}^{7}\widehat{\beta_i}}{8}$ with SE of $\frac{\sqrt{\sum_{i=1}^{8}\sum_{j=1}^{8}\boldsymbol{\Sigma}_{i,j}^{(\beta)}}}{8}$ [11], where $\boldsymbol{\Sigma}_{i,j}^{(\beta)}$ denoted the item of *i*-th row and *j*-th column of the calculated covariance matrix ($\boldsymbol{\Sigma}^{(\beta)}$) for all 8 regression coefficient of spring DST terms (i.e., β_i for i ranging from 0 to 7). Note that $\boldsymbol{\Sigma}^{(\beta)}$ was a submatrix of the overall covariance matrix $\boldsymbol{\Sigma}$, and thus

could be directly extracted from $\boldsymbol{\Sigma}$ without extra calculation. Similarly, we could also define the pooled RR $\bar{\gamma} = \frac{\sum_{i=0}^{7} \widehat{\gamma_i}}{8}$, and $\frac{\sqrt{\sum_{i=1}^{8}\sum_{j=1}^{8} \boldsymbol{\Sigma}_{i,j}^{(\gamma)}}}{8}$ for fall DST.

We interpreted the pooled RR as an aggregated (or average) weekly association between DST and mortality risk during the period from 0 to 7 weeks after DST transition.

S2.3 Calculation of absolute excess risk

The absolute excess risk of mortality associated with DST transitions was defined as the difference between the observed death rate and the expected (or baseline) death rate estimated from the regression model. Here, the expected death rate (baseline) was estimated as a "counterfactual" death rate by assuming no impacts of spring or fall DST transitions in each year. Thus, we used

- $\frac{y_t}{\text{population}_t} \cdot \left[1 - \exp\left(-\widehat{\beta_i} \cdot \text{DST}_{i,t}^{\text{spring}}\right)\right]$ to calculate the absolute excess mortality rate associated with the *i*-th week after spring DST transition, and
- $\frac{y_t}{\text{population}_t} \cdot \left[1 - \exp\left(-\widehat{\gamma_i} \cdot \text{DST}_{i,t}^{\text{fall}}\right)\right]$ to calculate the absolute excess mortality rate associated with the *i*-th week after fall DST transition.

Here,

- the term $\frac{y_t}{\text{population}_t}$ was the observed death rate calculated using the observed death counts (y_t) in the *t*-th week divided by the population size (population_t) at the *t*-th week's middle point;
- the term $\exp\left(-\widehat{\beta_i} \cdot \text{DST}_{i,t}^{\text{spring}}\right)$ was a multiplicative factor accounting for the impacts of the "absence" of spring DST transition in the *t*-th week, where the dummy variable $\text{DST}_{i,t}^{\text{spring}}$ could "silence" the effect of $\widehat{\beta_i}$, if the *t*-th week was not the *i*-th weeks following spring DST transition;
- similarly, the term $\exp\left(-\widehat{\gamma_i} \cdot \text{DST}_{i,t}^{\text{fall}}\right)$ was a multiplicative factor accounting for the impacts of the "absence" of fall DST transition in the *t*-th week, where the dummy variable $\text{DST}_{i,t}^{\text{fall}}$ "silenced" the effect of $\widehat{\gamma_i}$ if the *t*-th week was not the *i*-th weeks following fall DST transition;
- $\widehat{\beta_i}$ and $\widehat{\gamma_i}$ denoted the MLE of the regression coefficient of the *i*-th weeks following spring and fall DST transitions, respectively.

We calculated the absolute excess mortality rate in unit of weekly death counts per 100 000 population, or equivalently, death counts per 100 000 person-week. For interpretation, we noted that

- when absolute excess mortality rate was less than 0, the DST transitions was associated with a decreasing effect on the mortality risk; and
- when absolute excess mortality rate was larger than 0, the DST transitions was associated with an increasing effect on the mortality risk.

S2.3.1 Adjustment for the change in length of day on DST shifting dates

On the two DST shifting dates, the lengths of day change from 24 hours to 23 hours in spring, and change from 24 hours to 25 hours in fall. Such changes in the length of day needed to be accounted for when calculating the mortality rates on the week of DST transition (i.e., $i = 0$ for $\text{DST}_{i,t}^{\text{spring}}$ or $\text{DST}_{i,t}^{\text{fall}}$).

We made the following adjustment for the absolute excess mortality rate. When $i = 0$ for $\text{DST}_{i,t}^{\text{spring}}$ or $\text{DST}_{i,t}^{\text{fall}}$, the absolute excess mortality rate was calculated using

- $\frac{24\times7}{(24-1)+24\times6} \cdot \frac{y_t}{\text{population}_t} \cdot \left[1 - \exp\left(-\widehat{\beta_0} \cdot \text{DST}_{0,t}^{\text{spring}}\right)\right]$ for the week of spring DST transition, and
- $\frac{24\times7}{(24+1)+24\times6} \cdot \frac{y_t}{\text{population}_t} \cdot \left[1 - \exp\left(-\widehat{\gamma_0} \cdot \text{DST}_{0,t}^{\text{fall}}\right)\right]$ for the week of fall DST transition.

We noted that this adjustment was only applicable for the week involving the DST shifting dates, and thus no need for this adjustment regarding the 7 weeks after the DST transition weeks (i.e., for i ranging from 1 to 7).

S3 Subgroup analyses and sensitivity analyses

S3.1 Subgroup analyses

To explore the spatial heterogenicity, and demographic disparities of DST transition's effect on mortality risks with different causes, we performed several subgroup analyses for different causes of death, time zones, age, and ethnicity strata according to the data stratification below. We explored the patterns and mortality risks associated with daylight saving time (DST) for each stratum of the cause of death, time zone in the US, age, and ethnicity.

S3.1.1 Stratification by underlying causes of death

We stratified the mortality data in the US by 5 different major categories of the underlying causes of death with ICD-10 codes. The detailed categorization was as follows.

- Alzheimer disease (ICD-10: G30)
- Dementia (ICD-10: F00-F03)
- Circulatory diseases (ICD-10: I00-I09, I11, I13, I20-I51, I60-I69)
    - Diseases of heart (ICD-10: I00-I09, I11, I13, I20-I51)
    - Cerebrovascular diseases (ICD-10: I60-I69)
- Malignant neoplasms (ICD-10: C00-C97)
- Respiratory diseases (ICD-10: J00-J06, J10-J18, J30-J39, J40-J47, J67, J70-J98)
    - Influenza and pneumonia (ICD-10: J10-J18)
    - Chronic lower respiratory diseases (ICD-10: J40-J47)
    - Other diseases of the respiratory system (ICD-10: J00-J06, J30-J39, J67, J70-J98)

S3.1.2 Stratification by time zones

We aggregated the mortality data in different states (i.e., 50 states and DC) of the US into 6 different categories of the time zones. For those states across more than 1 time zone, we classified them by the place of their state capital cities. Although DST was not applicable in the most of regions in Arizona state and Hawaii state, we still included these two states in the analysis for the completeness of the national-level data of the US. The detailed categorization was as follows.

- Eastern time (ET) zone:
    - categorized by the place of whole state: Connecticut, Delaware, the District of Columbia (DC), Georgia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Vermont, Virginia, West Virginia; and
    - categorized by the place of state capital city: Florida, Indiana, Kentucky, Michigan, Tennessee.
- Central time (CT) zone:
    - categorized by the place of whole state: Alabama, Arkansas, Illinois, Iowa, Louisiana, Minnesota, Mississippi, Missouri, Oklahoma, Wisconsin; and
    - categorized by the place of state capital city: Kansas, Nebraska, North Dakota, South Dakota, Texas.
- Mountain time (MT) zone:
    - categorized by the place of whole state: Arizona, Colorado, Montana, New Mexico, Utah, Wyoming; and
    - categorized by the place of state capital city: none.
- Pacific time (PT) zone:
    - categorized by the place of whole state: California, Washington; and
    - categorized by the place of state capital city: Idaho, Nevada, Oregon.
- Alaska time (AT) zone:
    - categorized by the place of whole state: Alaska; and
    - categorized by the place of state capital city: none.
- Hawaii time (HT) zone:
    - categorized by the place of whole state: Hawaii; and
    - categorized by the place of state capital city: none.

DST was not applicable in all US dependencies including American Samoa, Guam, Northern Mariana Islands, Puerto Rico, US Minor Outlying Islands, and US Virgin Islands, and thus these places were excluded from this study.

S3.1.3 Stratification by age groups

According to the age stratifying scheme in the original mortality dataset, we considered the following age groups including age

- under 25 years,
- 25-44 years,
- 45-64 years,
- 65-74 years,
- 75-84 years, and
- 85 years and older.

S3.1.4 Stratification by ethnicity groups

According to the ethnicity categories in the original mortality dataset, we considered the following ethnicity groups including

- Hispanic,
- non-Hispanic Asian,
- non-Hispanic black,
- non-Hispanic white, and
- other ethnicities (including American Indian, Alaska native, native Hawaiian, and other Pacific islander).

For the last item here, all these ethnic minorities were grouped and labelled as “other ethnicities” in the original dataset.

S3.2 Sensitivity analyses

Multiple strategies for sensitivity analysis were conducted for evaluating the sensitivity of model estimates. We demonstrated the results of sensitivity analyses using the data of nationwide all-cause mortality in the US.

- First, we used the periodic spline, ps(), with degrees of freedom (df) at 4 and 5 according to the second and third smallest values of AIC score, whereas a df at 3 was used in the main analysis, to test the robustness of seasonal effect.
- Second, we used the natural cubic spline with degrees of freedom (df) at 3 and 5 according to the second and third smallest values of AIC score, whereas a df at 1 (equivalent to a linear effect) was used in the main analysis, to test the robustness of long-term temporal trend effect.
- Third, we set the effects of meteorological variables in mortality risk as a linear form, whereas natural spline was used in the main analysis for nonlinear associations, to test the robustness of confounder adjustment.
- Fourth, to check the duration of the change in mortality after DST transitions, we extended analysis to explore the change in mortality associated with DST shifting up to 0-8 weeks, whereas 0-7 weeks after DST were used in the main analysis, to test the robustness of the duration of effects of DST on mortality risks.
- Fifth, to check the sensitivity of the expect mortality estimates, we trained the regression model with the partial dataset excluding the observations in 0-7 weeks after spring and fall DST transitions, i.e., data in these 16 weeks were excluded for each year between 2015 and 2019. The expected mortality rate estimates were visualized in the same style as Fig 1 in the main text for comparison.
- Sixth, we considered that the periodic spline function, ps(), might be less restricted at the boundary sides of seasonal variables. Thus, we trained the regression model with seasonality indexed in May or September of each year, whereas the seasonality was indexed in January in the main analysis. The expected mortality rate estimates were visualized in the same style as Fig 1 in the main text for comparison.

- Seventh, similar to the concerns about our modelling adjustment of seasonality in the sixth point above, we used harmonic function (i.e., sine and cosine functions) to validate our results, where the periodicity of harmonic function is fixed at 1 year. The expected mortality rate estimates were visualized in the same style as Fig 1 in the main text for comparison.
- Eighth, we observed that the mortality rates during the first few weeks (i.e., in January) of each year were higher than the majority of other weeks, and thus we check the sensitivity of estimates by excluding the first 3 weeks in January from 2015 to 2019 from model fitting, whereas these data were included in the main analysis. The expected mortality rate estimates were visualized in the same style as Fig 1 in the main text for comparison.
- Ninth, since DST was not implemented in the most regions in Arizona state, and Hawaii state, we check the model estimates for Arizona state. The expected mortality rate estimates were visualized in the same style as Fig 1 in the main text for comparison. For Hawaii state, the results of model estimates could be found in Table S13.

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S4 Supplementary results

*S4.1 Supplementary results of subgroup analysis by different **underlying causes of death***

Table S1. Summary of observed and estimated **all-cause** mortality rate, and week-specific aRR after DST.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
All-cause						
week number after ***Spring*** DST						
0	17.43	17.42	0.011 (-0.266, 0.284)	1.001 (0.983, 1.018)	1.003 (0.987, 1.019)	0.834
1	17.32	17.28	0.033 (-0.242, 0.305)	1.002 (0.985, 1.019)	1.002 (0.986, 1.018)	0.851
2	17.09	17.14	-0.058 (-0.327, 0.208)	0.997 (0.979, 1.014)	1.002 (0.986, 1.018)	0.834
3	17.05	17.00	0.050 (-0.209, 0.306)	1.003 (0.986, 1.020)	1.009 (0.992, 1.025)	0.452
4	16.93	16.86	0.065 (-0.182, 0.308)	1.004 (0.986, 1.021)	1.006 (0.989, 1.022)	0.680
5	16.58	16.72	-0.146 (-0.378, 0.083)	0.991 (0.974, 1.009)	1.004 (0.987, 1.021)	0.751
6	16.38	16.59	-0.205 (-0.422, 0.009)	0.988 (0.971, 1.005)	0.996 (0.979, 1.012)	0.723
7	16.39	16.45	-0.067 (-0.269, 0.133)	0.996 (0.979, 1.013)	1.006 (0.990, 1.022)	0.667
week number after ***Fall*** DST						
0	16.48	16.70	-0.218 (-0.441, 0.001)	0.987 (0.970, 1.004)	0.977 (0.962, 0.993)	0.009
1	16.72	16.89	-0.170 (-0.396, 0.054)	0.990 (0.973, 1.007)	0.976 (0.960, 0.992)	0.007
2	16.73	17.09	-0.362 (-0.596, -0.131)	0.979 (0.962, 0.996)	0.970 (0.954, 0.986)	0.001
3	16.86	17.31	-0.446 (-0.696, -0.199)	0.974 (0.957, 0.991)	0.972 (0.957, 0.988)	0.001
4	17.22	17.54	-0.319 (-0.599, -0.044)	0.982 (0.965, 0.999)	0.979 (0.964, 0.995)	0.018
5	17.34	17.79	-0.451 (-0.779, -0.129)	0.975 (0.957, 0.992)	0.972 (0.956, 0.988)	0.002
6	17.57	18.05	-0.487 (-0.884, -0.098)	0.973 (0.955, 0.991)	0.974 (0.958, 0.990)	0.005
7	17.71	18.33	-0.621 (-1.110, -0.145)	0.966 (0.947, 0.985)	0.971 (0.952, 0.990)	0.007

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S2. Summary of observed and estimated mortality rate of **Alzheimer disease**, and week-specific aRR after DST.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Alzheimer disease						
week number after ***Spring*** DST						
0	0.74	0.74	0.006 (-0.019, 0.031)	1.008 (0.971, 1.047)	1.008 (0.971, 1.046)	0.716
1	0.73	0.73	0.003 (-0.022, 0.027)	1.004 (0.966, 1.043)	0.999 (0.962, 1.037)	0.972
2	0.73	0.72	0.011 (-0.014, 0.034)	1.015 (0.976, 1.054)	1.018 (0.980, 1.057)	0.477
3	0.72	0.71	0.011 (-0.013, 0.033)	1.015 (0.977, 1.054)	1.019 (0.981, 1.058)	0.477
4	0.69	0.70	-0.008 (-0.030, 0.014)	0.988 (0.951, 1.027)	0.983 (0.945, 1.022)	0.508
5	0.70	0.69	0.009 (-0.012, 0.029)	1.012 (0.974, 1.051)	1.025 (0.985, 1.067)	0.379
6	0.68	0.68	0.004 (-0.015, 0.023)	1.006 (0.968, 1.045)	1.013 (0.975, 1.053)	0.559
7	0.67	0.67	-0.006 (-0.024, 0.012)	0.991 (0.953, 1.030)	1.003 (0.964, 1.042)	0.928
week number after ***Fall*** DST						
0	0.72	0.73	-0.016 (-0.038, 0.004)	0.978 (0.941, 1.015)	0.966 (0.930, 1.002)	0.156
1	0.74	0.74	-0.009 (-0.031, 0.012)	0.987 (0.951, 1.025)	0.974 (0.938, 1.011)	0.325
2	0.74	0.76	-0.021 (-0.043, 0.001)	0.973 (0.937, 1.009)	0.965 (0.930, 1.002)	0.156
3	0.74	0.77	-0.030 (-0.054, -0.007)	0.961 (0.926, 0.997)	0.962 (0.927, 0.997)	0.097
4	0.76	0.78	-0.023 (-0.049, 0.002)	0.970 (0.935, 1.007)	0.973 (0.938, 1.009)	0.292
5	0.78	0.80	-0.020 (-0.051, 0.009)	0.974 (0.938, 1.012)	0.976 (0.940, 1.012)	0.343
6	0.80	0.81	-0.013 (-0.050, 0.022)	0.984 (0.946, 1.022)	0.986 (0.950, 1.024)	0.549
7	0.78	0.83	-0.047 (-0.093, -0.004)	0.943 (0.905, 0.983)	0.953 (0.912, 0.996)	0.097

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

457 Table S3. Summary of observed and estimated mortality rate of **dementia**, and week-specific aRR
458 after DST.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Dementia						
week number after ***Spring*** DST						
0	0.88	0.89	-0.008 (-0.043, 0.025)	0.990 (0.948, 1.033)	0.999 (0.961, 1.039)	0.972
1	0.89	0.87	0.018 (-0.016, 0.051)	1.020 (0.977, 1.064)	1.022 (0.983, 1.062)	0.299
2	0.87	0.86	0.010 (-0.023, 0.042)	1.011 (0.968, 1.055)	1.028 (0.989, 1.069)	0.189
3	0.86	0.85	0.014 (-0.018, 0.044)	1.016 (0.973, 1.060)	1.031 (0.991, 1.073)	0.154
4	0.86	0.84	0.022 (-0.008, 0.051)	1.026 (0.983, 1.071)	1.041 (0.999, 1.083)	0.074
5	0.84	0.82	0.012 (-0.016, 0.039)	1.013 (0.970, 1.058)	1.050 (1.007, 1.095)	0.034
6	0.81	0.81	-0.007 (-0.033, 0.018)	0.991 (0.948, 1.034)	1.012 (0.972, 1.053)	0.604
7	0.81	0.80	0.012 (-0.013, 0.035)	1.014 (0.971, 1.058)	1.038 (0.997, 1.080)	0.090
week number after ***Fall*** DST						
0	0.86	0.87	-0.014 (-0.044, 0.014)	0.983 (0.942, 1.026)	0.956 (0.919, 0.994)	0.036
1	0.88	0.89	-0.004 (-0.033, 0.025)	0.995 (0.954, 1.038)	0.954 (0.917, 0.992)	0.033
2	0.87	0.90	-0.037 (-0.067, -0.007)	0.959 (0.919, 1.001)	0.931 (0.896, 0.968)	0.002
3	0.89	0.92	-0.031 (-0.063, 0.000)	0.966 (0.926, 1.007)	0.958 (0.922, 0.994)	0.036
4	0.91	0.94	-0.035 (-0.071, -0.001)	0.962 (0.922, 1.003)	0.952 (0.916, 0.989)	0.022
5	0.92	0.96	-0.038 (-0.080, 0.002)	0.960 (0.920, 1.002)	0.950 (0.914, 0.987)	0.020
6	0.93	0.98	-0.056 (-0.106, -0.008)	0.943 (0.902, 0.985)	0.950 (0.913, 0.989)	0.022
7	0.92	1.00	-0.087 (-0.149, -0.028)	0.914 (0.872, 0.957)	0.925 (0.883, 0.969)	0.004

459 *Note*: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with
460 adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).
461

462 Table S4. Summary of observed and estimated mortality rate of **circulatory diseases**, and week-
463 specific aRR after DST.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Circulatory diseases						
week number after ***Spring*** DST						
0	5.41	5.40	0.010 (-0.082, 0.100)	1.002 (0.983, 1.020)	1.004 (0.988, 1.020)	0.711
1	5.35	5.35	0.004 (-0.088, 0.093)	1.001 (0.982, 1.019)	0.999 (0.983, 1.016)	0.912
2	5.29	5.30	-0.012 (-0.101, 0.076)	0.998 (0.979, 1.016)	1.005 (0.988, 1.021)	0.684
3	5.25	5.25	0.002 (-0.084, 0.086)	1.000 (0.982, 1.019)	1.005 (0.989, 1.022)	0.647
4	5.22	5.20	0.021 (-0.061, 0.101)	1.004 (0.985, 1.023)	1.008 (0.990, 1.025)	0.552
5	5.12	5.15	-0.029 (-0.105, 0.046)	0.994 (0.976, 1.013)	1.007 (0.990, 1.025)	0.558
6	5.05	5.10	-0.046 (-0.117, 0.025)	0.991 (0.973, 1.009)	0.998 (0.982, 1.015)	0.893
7	5.03	5.05	-0.021 (-0.088, 0.045)	0.996 (0.977, 1.014)	1.006 (0.989, 1.023)	0.647
week number after ***Fall*** DST						
0	5.04	5.10	-0.055 (-0.129, 0.017)	0.989 (0.971, 1.008)	0.975 (0.959, 0.992)	0.009
1	5.16	5.16	-0.004 (-0.079, 0.069)	0.999 (0.981, 1.018)	0.979 (0.962, 0.995)	0.027
2	5.20	5.24	-0.036 (-0.113, 0.039)	0.993 (0.975, 1.012)	0.978 (0.962, 0.995)	0.022
3	5.26	5.32	-0.058 (-0.140, 0.022)	0.989 (0.971, 1.007)	0.985 (0.969, 1.001)	0.102
4	5.35	5.41	-0.053 (-0.144, 0.037)	0.990 (0.972, 1.009)	0.985 (0.969, 1.001)	0.102
5	5.39	5.50	-0.117 (-0.223, -0.012)	0.979 (0.960, 0.998)	0.973 (0.957, 0.990)	0.005
6	5.47	5.61	-0.139 (-0.269, -0.013)	0.975 (0.956, 0.994)	0.978 (0.961, 0.995)	0.022
7	5.59	5.72	-0.124 (-0.283, 0.032)	0.978 (0.958, 0.999)	0.987 (0.968, 1.007)	0.293

464 *Note*: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with
465 adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

466

Table S5. Summary of observed and estimated mortality rate of **malignant neoplasms**, and week-specific aRR after DST.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Malignant neoplasms						
week number after ***Spring*** DST						
0	3.59	3.58	0.017 (-0.021, 0.055)	1.005 (0.993, 1.017)	1.006 (0.995, 1.018)	0.370
1	3.61	3.57	0.039 (0.001, 0.077)	1.011 (0.999, 1.023)	1.012 (1.001, 1.024)	0.047
2	3.54	3.56	-0.014 (-0.051, 0.023)	0.996 (0.984, 1.008)	0.999 (0.987, 1.010)	0.868
3	3.56	3.55	0.005 (-0.032, 0.041)	1.001 (0.990, 1.013)	1.005 (0.993, 1.016)	0.553
4	3.58	3.54	0.034 (-0.000, 0.069)	1.010 (0.998, 1.021)	1.012 (1.000, 1.024)	0.073
5	3.52	3.54	-0.019 (-0.052, 0.014)	0.995 (0.983, 1.006)	1.002 (0.989, 1.014)	0.868
6	3.53	3.53	-0.001 (-0.032, 0.029)	1.000 (0.988, 1.011)	1.004 (0.993, 1.016)	0.563
7	3.55	3.52	0.022 (-0.007, 0.050)	1.006 (0.995, 1.018)	1.011 (0.999, 1.023)	0.088
week number after ***Fall*** DST						
0	3.59	3.62	-0.031 (-0.063, -0.000)	0.991 (0.980, 1.003)	0.989 (0.977, 1.000)	0.073
1	3.60	3.63	-0.029 (-0.061, 0.003)	0.992 (0.981, 1.003)	0.987 (0.976, 0.999)	0.066
2	3.57	3.64	-0.069 (-0.101, -0.036)	0.981 (0.970, 0.993)	0.979 (0.968, 0.990)	0.003
3	3.53	3.65	-0.119 (-0.154, -0.085)	0.967 (0.956, 0.979)	0.967 (0.956, 0.978)	<0.001
4	3.59	3.66	-0.066 (-0.104, -0.029)	0.982 (0.970, 0.993)	0.981 (0.970, 0.993)	0.006
5	3.62	3.67	-0.050 (-0.093, -0.007)	0.986 (0.975, 0.998)	0.986 (0.975, 0.998)	0.042
6	3.63	3.68	-0.052 (-0.104, -0.001)	0.986 (0.974, 0.998)	0.987 (0.975, 0.999)	0.067
7	3.54	3.69	-0.142 (-0.205, -0.081)	0.961 (0.949, 0.974)	0.966 (0.952, 0.980)	<0.001

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S6. Summary of observed and estimated mortality rate of **respiratory diseases**, and week-specific aRR after DST.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Respiratory diseases						
week number after ***Spring*** DST						
0	1.94	1.92	0.020 (-0.058, 0.095)	1.011 (0.967, 1.055)	1.016 (0.975, 1.059)	0.571
1	1.90	1.89	0.014 (-0.062, 0.088)	1.008 (0.964, 1.053)	1.010 (0.968, 1.053)	0.698
2	1.86	1.85	0.013 (-0.061, 0.085)	1.007 (0.964, 1.052)	1.017 (0.975, 1.061)	0.571
3	1.83	1.81	0.017 (-0.054, 0.085)	1.009 (0.965, 1.055)	1.019 (0.976, 1.064)	0.548
4	1.79	1.78	0.018 (-0.048, 0.082)	1.010 (0.966, 1.056)	1.011 (0.967, 1.057)	0.698
5	1.72	1.74	-0.020 (-0.082, 0.040)	0.988 (0.945, 1.033)	1.012 (0.967, 1.060)	0.698
6	1.67	1.70	-0.034 (-0.092, 0.022)	0.980 (0.936, 1.025)	0.997 (0.953, 1.041)	0.906
7	1.63	1.67	-0.037 (-0.091, 0.015)	0.978 (0.934, 1.023)	0.997 (0.953, 1.043)	0.906
week number after ***Fall*** DST						
0	1.49	1.56	-0.067 (-0.125, -0.011)	0.957 (0.912, 1.004)	0.943 (0.900, 0.988)	0.030
1	1.52	1.60	-0.077 (-0.137, -0.020)	0.952 (0.908, 0.998)	0.929 (0.886, 0.974)	0.008
2	1.54	1.65	-0.112 (-0.173, -0.052)	0.932 (0.889, 0.977)	0.924 (0.882, 0.968)	0.004
3	1.6	1.70	-0.106 (-0.172, -0.043)	0.938 (0.895, 0.982)	0.938 (0.896, 0.980)	0.013
4	1.66	1.76	-0.102 (-0.176, -0.031)	0.942 (0.899, 0.986)	0.941 (0.899, 0.983)	0.019
5	1.69	1.82	-0.137 (-0.225, -0.054)	0.925 (0.882, 0.969)	0.922 (0.881, 0.964)	0.002
6	1.74	1.90	-0.155 (-0.263, -0.053)	0.918 (0.875, 0.964)	0.919 (0.877, 0.962)	0.002
7	1.86	1.98	-0.112 (-0.248, 0.015)	0.943 (0.897, 0.992)	0.958 (0.909, 1.009)	0.178

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

*S4.2 Supplementary results of subgroup analysis by different **time zones***

Table S7. Summary of observed and estimated all-cause mortality rate, and aRR pooled for 0-7 weeks after DST, stratified by time zones.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Eastern time (ET) zone						
0-7 weeks after Spring DST	17.52	17.53	-0.012 (-0.315, 0.286)	0.999 (0.979, 1.020)	1.008 (0.989, 1.028)	0.345
0-7 weeks after Fall DST	17.62	18.09	-0.468 (-0.835, -0.108)	0.974 (0.954, 0.995)	0.970 (0.951, 0.989)	0.005
0-7 weeks after either DST	17.57	17.81	-0.240 (-0.575, 0.089)	0.987 (0.966, 1.007)	0.989 (0.970, 1.008)	0.039
Central time (CT) zone						
0-7 weeks after Spring DST	16.76	16.83	-0.077 (-0.370, 0.212)	0.995 (0.975, 1.016)	0.997 (0.978, 1.016)	0.724
0-7 weeks after Fall DST	17.17	17.42	-0.255 (-0.618, 0.101)	0.986 (0.965, 1.007)	0.982 (0.962, 1.001)	0.114
0-7 weeks after either DST	16.96	17.13	-0.166 (-0.494, 0.156)	0.990 (0.970, 1.011)	0.989 (0.970, 1.009)	0.287
Mountain time (MT) zone						
0-7 weeks after Spring DST	15.28	15.18	0.109 (-0.219, 0.429)	1.007 (0.981, 1.033)	1.008 (0.982, 1.033)	0.459
0-7 weeks after Fall DST	15.08	15.38	-0.298 (-0.690, 0.083)	0.981 (0.955, 1.007)	0.980 (0.955, 1.007)	0.199
0-7 weeks after either DST	15.18	15.28	-0.095 (-0.454, 0.256)	0.994 (0.968, 1.020)	0.994 (0.969, 1.020)	0.302
Pacific time (PT) zone						
0-7 weeks after Spring DST	14.08	14.13	-0.053 (-0.325, 0.215)	0.996 (0.974, 1.019)	0.995 (0.973, 1.017)	0.558
0-7 weeks after Fall DST	14.24	14.58	-0.337 (-0.674, -0.008)	0.973 (0.951, 0.997)	0.975 (0.952, 0.998)	0.079
0-7 weeks after either DST	14.16	14.36	-0.195 (-0.500, 0.103)	0.985 (0.962, 1.008)	0.985 (0.962, 1.008)	0.209
Alaska time zone						
0-7 weeks after Spring DST	11.01	10.87	0.140 (-0.948, 1.128)	1.012 (0.901, 1.133)	1.018 (0.893, 1.156)	0.865
0-7 weeks after Fall DST	11.79	11.68	0.109 (-1.199, 1.279)	1.009 (0.899, 1.128)	1.005 (0.891, 1.130)	0.865
0-7 weeks after either DST	11.40	11.28	0.124 (-1.074, 1.203)	1.010 (0.900, 1.131)	1.011 (0.892, 1.143)	0.865
Hawaii time zone						
0-7 weeks after Spring DST	15.35	15.59	-0.247 (-1.187, 0.640)	0.983 (0.915, 1.055)	0.987 (0.918, 1.061)	0.545
0-7 weeks after Fall DST	15.35	15.85	-0.503 (-1.591, 0.512)	0.968 (0.899, 1.040)	0.966 (0.896, 1.040)	0.600
0-7 weeks after either DST	15.35	15.72	-0.375 (-1.389, 0.576)	0.975 (0.907, 1.048)	0.976 (0.907, 1.050)	0.572

480 *Note*: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with
481 adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).
482

Table S8. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST in the **Eastern time (ET) zone**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Eastern time (ET) zone						
week number after ***Spring*** DST						
0	17.95	18.06	-0.106 (-0.446, 0.227)	0.994 (0.974, 1.015)	0.997 (0.978, 1.016)	0.789
1	17.94	17.91	0.032 (-0.305, 0.364)	1.002 (0.981, 1.022)	1.001 (0.983, 1.020)	0.886
2	17.85	17.76	0.089 (-0.242, 0.413)	1.005 (0.984, 1.026)	1.017 (0.998, 1.037)	0.110
3	17.72	17.61	0.111 (-0.206, 0.423)	1.006 (0.986, 1.027)	1.017 (0.998, 1.037)	0.113
4	17.60	17.46	0.141 (-0.161, 0.438)	1.008 (0.988, 1.029)	1.016 (0.996, 1.036)	0.137
5	17.21	17.31	-0.096 (-0.380, 0.183)	0.994 (0.974, 1.015)	1.009 (0.990, 1.029)	0.418
6	16.96	17.16	-0.201 (-0.467, 0.060)	0.988 (0.968, 1.009)	1.002 (0.983, 1.021)	0.854
7	16.95	17.01	-0.066 (-0.314, 0.178)	0.996 (0.976, 1.016)	1.008 (0.989, 1.027)	0.469
week number after ***Fall*** DST						
0	16.99	17.33	-0.340 (-0.613, -0.072)	0.980 (0.960, 1.001)	0.972 (0.953, 0.990)	0.006
1	17.32	17.52	-0.195 (-0.472, 0.077)	0.989 (0.969, 1.009)	0.974 (0.956, 0.993)	0.013
2	17.32	17.72	-0.406 (-0.692, -0.126)	0.977 (0.957, 0.997)	0.965 (0.947, 0.984)	0.001
3	17.48	17.94	-0.456 (-0.760, -0.158)	0.975 (0.955, 0.995)	0.969 (0.952, 0.988)	0.003
4	17.81	18.17	-0.359 (-0.697, -0.026)	0.980 (0.960, 1.001)	0.972 (0.954, 0.991)	0.007
5	17.92	18.42	-0.494 (-0.889, -0.107)	0.973 (0.953, 0.994)	0.972 (0.953, 0.991)	0.007
6	18.03	18.67	-0.640 (-1.117, -0.174)	0.966 (0.945, 0.987)	0.968 (0.949, 0.987)	0.004
7	18.09	18.95	-0.851 (-1.439, -0.281)	0.955 (0.933, 0.977)	0.965 (0.945, 0.986)	0.003

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S9. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST in the **Central time (CT) zone**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Central time (CT) zone						
week number after ***Spring*** DST						
0	17.30	17.29	0.008 (-0.321, 0.330)	1.000 (0.980, 1.021)	1.002 (0.983, 1.021)	0.925
1	17.23	17.16	0.063 (-0.263, 0.384)	1.004 (0.983, 1.025)	1.001 (0.982, 1.020)	0.933
2	16.87	17.03	-0.160 (-0.480, 0.153)	0.990 (0.970, 1.011)	0.996 (0.977, 1.016)	0.829
3	16.85	16.90	-0.047 (-0.355, 0.255)	0.997 (0.977, 1.018)	0.994 (0.975, 1.014)	0.700
4	16.75	16.77	-0.015 (-0.308, 0.272)	0.999 (0.978, 1.020)	0.999 (0.980, 1.019)	0.933
5	16.38	16.64	-0.253 (-0.529, 0.018)	0.985 (0.964, 1.005)	0.992 (0.973, 1.012)	0.560
6	16.31	16.51	-0.199 (-0.457, 0.054)	0.988 (0.968, 1.008)	0.988 (0.969, 1.007)	0.349
7	16.38	16.38	-0.008 (-0.248, 0.229)	0.999 (0.979, 1.020)	1.003 (0.984, 1.023)	0.829
week number after ***Fall*** DST						
0	16.63	16.73	-0.106 (-0.371, 0.155)	0.994 (0.974, 1.014)	0.983 (0.965, 1.002)	0.152
1	16.85	16.91	-0.059 (-0.329, 0.207)	0.997 (0.976, 1.017)	0.990 (0.971, 1.009)	0.410
2	16.86	17.09	-0.225 (-0.505, 0.050)	0.987 (0.967, 1.007)	0.978 (0.959, 0.997)	0.063
3	16.84	17.29	-0.449 (-0.748, -0.154)	0.974 (0.954, 0.994)	0.972 (0.953, 0.990)	0.012
4	17.19	17.49	-0.304 (-0.640, 0.026)	0.983 (0.962, 1.003)	0.982 (0.963, 1.001)	0.116
5	17.44	17.71	-0.270 (-0.664, 0.115)	0.985 (0.964, 1.006)	0.980 (0.961, 0.999)	0.093
6	17.75	17.95	-0.194 (-0.670, 0.269)	0.989 (0.968, 1.011)	0.988 (0.968, 1.009)	0.361
7	17.76	18.19	-0.430 (-1.015, 0.137)	0.976 (0.954, 0.999)	0.981 (0.959, 1.003)	0.152

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S10. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST in the **Mountain time (MT) zone**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Mountain time (MT) zone						
week number after ***Spring*** DST						
0	15.90	15.55	0.351 (-0.015, 0.708)	1.022 (0.997, 1.049)	1.022 (0.997, 1.048)	0.245
1	15.76	15.45	0.313 (-0.051, 0.669)	1.020 (0.994, 1.046)	1.019 (0.994, 1.045)	0.324
2	15.25	15.34	-0.087 (-0.444, 0.261)	0.994 (0.969, 1.020)	0.994 (0.969, 1.019)	0.748
3	15.39	15.23	0.159 (-0.184, 0.495)	1.010 (0.985, 1.036)	1.008 (0.983, 1.033)	0.744
4	15.47	15.12	0.348 (0.021, 0.667)	1.023 (0.997, 1.049)	1.026 (1.000, 1.053)	0.141
5	15.13	15.01	0.120 (-0.187, 0.422)	1.008 (0.982, 1.033)	1.008 (0.983, 1.034)	0.738
6	14.64	14.91	-0.262 (-0.550, 0.020)	0.982 (0.958, 1.008)	0.987 (0.962, 1.012)	0.472
7	14.73	14.80	-0.072 (-0.341, 0.192)	0.995 (0.970, 1.020)	0.997 (0.973, 1.023)	0.912
week number after ***Fall*** DST						
0	14.70	14.64	0.059 (-0.230, 0.343)	1.004 (0.979, 1.030)	1.002 (0.977, 1.028)	0.915
1	14.77	14.81	-0.033 (-0.326, 0.254)	0.998 (0.973, 1.023)	0.994 (0.969, 1.020)	0.756
2	14.76	14.99	-0.232 (-0.534, 0.064)	0.985 (0.960, 1.010)	0.983 (0.958, 1.008)	0.364
3	14.94	15.20	-0.262 (-0.584, 0.053)	0.983 (0.958, 1.008)	0.985 (0.960, 1.010)	0.397
4	15.24	15.44	-0.202 (-0.562, 0.150)	0.986 (0.961, 1.012)	0.987 (0.962, 1.012)	0.472
5	15.02	15.69	-0.675 (-1.097, -0.264)	0.957 (0.932, 0.982)	0.957 (0.932, 0.982)	0.006
6	15.46	15.98	-0.519 (-1.030, -0.023)	0.968 (0.942, 0.994)	0.969 (0.943, 0.996)	0.093
7	15.77	16.29	-0.521 (-1.154, 0.088)	0.968 (0.941, 0.996)	0.967 (0.939, 0.996)	0.093

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S11. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST in the **Pacific time (PT) zone**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Pacific time (PT) zone						
week number after ***Spring*** DST						
0	14.78	14.54	0.240 (-0.066, 0.539)	1.017 (0.994, 1.040)	1.014 (0.992, 1.037)	0.375
1	14.40	14.42	-0.021 (-0.325, 0.277)	0.999 (0.976, 1.022)	0.998 (0.976, 1.020)	0.919
2	14.06	14.30	-0.241 (-0.538, 0.050)	0.983 (0.961, 1.006)	0.986 (0.964, 1.008)	0.375
3	14.23	14.19	0.046 (-0.240, 0.326)	1.003 (0.981, 1.027)	1.000 (0.978, 1.022)	0.999
4	13.94	14.07	-0.127 (-0.399, 0.140)	0.991 (0.968, 1.014)	0.990 (0.968, 1.013)	0.506
5	13.84	13.96	-0.115 (-0.370, 0.137)	0.992 (0.969, 1.015)	0.989 (0.967, 1.011)	0.468
6	13.73	13.85	-0.119 (-0.358, 0.116)	0.991 (0.969, 1.014)	0.993 (0.970, 1.015)	0.608
7	13.65	13.74	-0.084 (-0.308, 0.136)	0.994 (0.971, 1.016)	0.990 (0.969, 1.012)	0.506
week number after ***Fall*** DST						
0	13.66	13.76	-0.095 (-0.338, 0.144)	0.993 (0.971, 1.016)	0.993 (0.971, 1.016)	0.614
1	13.67	13.94	-0.277 (-0.525, -0.033)	0.980 (0.958, 1.003)	0.979 (0.957, 1.001)	0.144
2	13.77	14.15	-0.379 (-0.636, -0.127)	0.973 (0.951, 0.996)	0.974 (0.952, 0.996)	0.070
3	13.91	14.38	-0.474 (-0.749, -0.204)	0.967 (0.945, 0.989)	0.969 (0.947, 0.991)	0.025
4	14.44	14.64	-0.207 (-0.517, 0.096)	0.986 (0.963, 1.008)	0.984 (0.962, 1.007)	0.331
5	14.43	14.93	-0.501 (-0.866, -0.145)	0.966 (0.944, 0.989)	0.972 (0.949, 0.995)	0.063
6	14.77	15.24	-0.476 (-0.920, -0.044)	0.969 (0.945, 0.992)	0.972 (0.949, 0.996)	0.070
7	15.30	15.59	-0.288 (-0.839, 0.245)	0.954 (0.928, 0.981)	0.955 (0.929, 0.982)	0.006

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S12. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST in the **Alaska time (AT) zone**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Alaska time zone						
week number after ***Spring*** DST						
0	10.83	10.95	-0.126 (-1.331, 0.960)	0.988 (0.878, 1.109)	1.011 (0.887, 1.149)	0.865
1	10.85	10.92	-0.062 (-1.263, 1.020)	0.994 (0.883, 1.115)	0.978 (0.856, 1.112)	0.865
2	11.34	10.89	0.455 (-0.722, 1.518)	1.041 (0.928, 1.166)	1.035 (0.909, 1.173)	0.865
3	11.07	10.86	0.205 (-0.932, 1.235)	1.019 (0.907, 1.141)	1.040 (0.912, 1.182)	0.865
4	11.56	10.85	0.711 (-0.374, 1.698)	1.065 (0.951, 1.190)	1.074 (0.945, 1.216)	0.865
5	10.50	10.84	-0.335 (-1.361, 0.602)	0.969 (0.861, 1.086)	0.985 (0.863, 1.120)	0.865
6	10.80	10.83	-0.029 (-0.993, 0.857)	0.997 (0.888, 1.115)	0.980 (0.858, 1.113)	0.865
7	11.12	10.82	0.299 (-0.605, 1.134)	1.027 (0.917, 1.147)	1.045 (0.919, 1.183)	0.865
week number after ***Fall*** DST						
0	11.69	11.39	0.297 (-0.717, 1.228)	1.026 (0.918, 1.143)	1.041 (0.926, 1.165)	0.865
1	11.28	11.46	-0.177 (-1.196, 0.759)	0.984 (0.879, 1.099)	0.985 (0.876, 1.105)	0.865
2	11.39	11.53	-0.143 (-1.181, 0.809)	0.987 (0.882, 1.102)	0.984 (0.875, 1.103)	0.865
3	12.23	11.62	0.613 (-0.475, 1.608)	1.053 (0.943, 1.171)	1.046 (0.935, 1.168)	0.865
4	11.50	11.71	-0.211 (-1.407, 0.874)	0.982 (0.876, 1.097)	0.970 (0.863, 1.087)	0.865
5	12.36	11.81	0.557 (-0.826, 1.795)	1.047 (0.935, 1.169)	1.047 (0.928, 1.178)	0.865
6	12.12	11.92	0.203 (-1.464, 1.665)	1.017 (0.904, 1.141)	1.013 (0.892, 1.148)	0.865
7	11.77	12.04	-0.269 (-2.329, 1.490)	0.977 (0.862, 1.106)	0.956 (0.835, 1.091)	0.865

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S13. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST in the **Hawaii time (HT) zone**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Hawaii time zone						
week number after ***Spring*** DST						
0	16.66	15.79	0.872 (-0.174, 1.852)	1.055 (0.983, 1.131)	1.063 (0.990, 1.141)	0.408
1	15.43	15.72	-0.293 (-1.334, 0.683)	0.981 (0.912, 1.054)	0.989 (0.918, 1.063)	0.788
2	16.03	15.67	0.369 (-0.651, 1.326)	1.024 (0.953, 1.098)	1.028 (0.956, 1.103)	0.762
3	15.53	15.61	-0.086 (-1.069, 0.840)	0.994 (0.925, 1.067)	1.000 (0.929, 1.074)	0.998
4	15.23	15.56	-0.330 (-1.268, 0.555)	0.979 (0.910, 1.051)	0.987 (0.917, 1.062)	0.788
5	14.00	15.51	-1.509 (-2.395, -0.672)	0.903 (0.838, 0.971)	0.906 (0.841, 0.976)	0.094
6	14.75	15.47	-0.718 (-1.549, 0.072)	0.953 (0.887, 1.024)	0.955 (0.888, 1.026)	0.568
7	15.15	15.42	-0.276 (-1.056, 0.466)	0.982 (0.914, 1.053)	0.976 (0.909, 1.048)	0.762
week number after ***Fall*** DST						
0	14.85	15.09	-0.238 (-1.075, 0.555)	0.984 (0.916, 1.057)	0.985 (0.915, 1.058)	0.788
1	14.11	15.24	-1.128 (-1.971, -0.329)	0.926 (0.860, 0.996)	0.927 (0.860, 0.998)	0.266
2	14.71	15.42	-0.717 (-1.577, 0.097)	0.953 (0.887, 1.024)	0.951 (0.882, 1.023)	0.547
3	15.95	15.64	0.307 (-0.596, 1.160)	1.020 (0.950, 1.093)	1.017 (0.946, 1.092)	0.788
4	15.66	15.89	-0.224 (-1.216, 0.710)	0.986 (0.918, 1.058)	0.983 (0.914, 1.056)	0.788
5	15.48	16.17	-0.691 (-1.841, 0.382)	0.957 (0.889, 1.029)	0.949 (0.880, 1.022)	0.547
6	15.73	16.50	-0.764 (-2.156, 0.520)	0.954 (0.884, 1.027)	0.954 (0.882, 1.030)	0.568
7	16.30	16.86	-0.568 (-2.299, 1.002)	0.966 (0.894, 1.044)	0.962 (0.888, 1.042)	0.762

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

514 *S4.3 Supplementary results of subgroup analysis by different **age groups***

515 Table S14. Summary of observed and estimated all-cause mortality rate, and aRR pooled for 0-7
516 weeks after DST, stratified by age groups.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Age under 25 years						
0-7 weeks after Spring DST	1.05	1.06	-0.007 (-0.041, 0.026)	0.993 (0.955, 1.031)	0.990 (0.953, 1.029)	0.642
0-7 weeks after Fall DST	1.03	1.02	0.011 (-0.027, 0.046)	1.010 (0.971, 1.050)	1.014 (0.976, 1.054)	0.619
0-7 weeks after either DST	1.04	1.04	0.002 (-0.034, 0.036)	1.001 (0.963, 1.040)	1.002 (0.965, 1.041)	0.630
Age 25-44 years						
0-7 weeks after Spring DST	3.19	3.21	-0.013 (-0.107, 0.078)	0.995 (0.961, 1.030)	0.995 (0.961, 1.030)	0.673
0-7 weeks after Fall DST	3.26	3.30	-0.044 (-0.152, 0.061)	0.986 (0.952, 1.021)	0.990 (0.956, 1.024)	0.756
0-7 weeks after either DST	3.22	3.25	-0.029 (-0.130, 0.069)	0.991 (0.956, 1.026)	0.992 (0.959, 1.027)	0.713
Age 45-64 years						
0-7 weeks after Spring DST	13.74	13.84	-0.093 (-0.293, 0.105)	0.993 (0.976, 1.010)	0.995 (0.979, 1.012)	0.259
0-7 weeks after Fall DST	13.81	13.96	-0.157 (-0.394, 0.076)	0.989 (0.972, 1.006)	0.987 (0.970, 1.003)	0.177
0-7 weeks after either DST	13.77	13.90	-0.125 (-0.343, 0.090)	0.991 (0.974, 1.008)	0.991 (0.975, 1.007)	0.214
Age 65-74 years						
0-7 weeks after Spring DST	33.74	33.77	-0.021 (-0.523, 0.472)	0.999 (0.981, 1.016)	1.003 (0.986, 1.021)	0.597
0-7 weeks after Fall DST	34.40	34.94	-0.547 (-1.155, 0.051)	0.984 (0.967, 1.002)	0.981 (0.964, 0.998)	0.058
0-7 weeks after either DST	34.07	34.35	-0.284 (-0.839, 0.261)	0.991 (0.974, 1.009)	0.992 (0.975, 1.009)	0.185
Age 75-84 years						
0-7 weeks after Spring DST	87.24	87.43	-0.196 (-1.675, 1.259)	0.997 (0.978, 1.018)	1.004 (0.985, 1.024)	0.645
0-7 weeks after Fall DST	88.58	90.87	-2.297 (-4.126, -0.506)	0.975 (0.955, 0.995)	0.968 (0.950, 0.987)	0.003
0-7 weeks after either DST	87.91	89.15	-1.246 (-2.901, 0.377)	0.986 (0.966, 1.006)	0.986 (0.967, 1.005)	0.041
Age 85 years and older						
0-7 weeks after Spring DST	315.43	315.74	-0.308 (-7.279, 6.511)	0.999 (0.973, 1.025)	1.009 (0.984, 1.034)	0.541
0-7 weeks after Fall DST	317.97	327.70	-9.730 (-18.512, -1.194)	0.971 (0.945, 0.997)	0.965 (0.941, 0.990)	0.015
0-7 weeks after either DST	316.70	321.72	-5.019 (-12.896, 2.659)	0.985 (0.959, 1.011)	0.987 (0.962, 1.012)	0.090

517 *Note*: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with
518 adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

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Table S15. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST among the population with **age under 25 years**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Age under 25 years						
week number after ***Spring*** DST						
0	1.04	1.04	-0.003 (-0.040, 0.033)	0.996 (0.958, 1.036)	0.990 (0.953, 1.028)	0.721
1	1.08	1.05	0.032 (-0.005, 0.068)	1.030 (0.991, 1.070)	1.025 (0.987, 1.064)	0.516
2	1.04	1.05	-0.011 (-0.048, 0.025)	0.989 (0.951, 1.028)	0.986 (0.949, 1.024)	0.696
3	1.03	1.06	-0.022 (-0.058, 0.012)	0.979 (0.941, 1.017)	0.977 (0.940, 1.015)	0.516
4	1.05	1.06	-0.014 (-0.048, 0.020)	0.987 (0.949, 1.025)	0.978 (0.941, 1.017)	0.565
5	1.05	1.06	-0.016 (-0.048, 0.016)	0.985 (0.948, 1.023)	0.984 (0.946, 1.024)	0.689
6	1.05	1.07	-0.020 (-0.050, 0.010)	0.981 (0.944, 1.018)	0.982 (0.945, 1.019)	0.607
7	1.07	1.07	-0.004 (-0.033, 0.024)	0.996 (0.960, 1.033)	1.002 (0.965, 1.040)	0.909
week number after ***Fall*** DST						
0	1.02	1.02	-0.006 (-0.036, 0.022)	0.993 (0.956, 1.032)	0.993 (0.956, 1.031)	0.816
1	1.04	1.02	0.021 (-0.009, 0.049)	1.020 (0.982, 1.059)	1.032 (0.993, 1.072)	0.406
2	1.04	1.02	0.018 (-0.012, 0.047)	1.017 (0.979, 1.056)	1.024 (0.986, 1.063)	0.516
3	1.03	1.02	0.014 (-0.018, 0.044)	1.013 (0.974, 1.052)	1.017 (0.979, 1.055)	0.653
4	1.02	1.02	0.002 (-0.032, 0.035)	1.001 (0.963, 1.041)	1.010 (0.972, 1.049)	0.721
5	1.03	1.02	0.014 (-0.025, 0.052)	1.013 (0.974, 1.054)	1.020 (0.982, 1.060)	0.582
6	1.04	1.02	0.027 (-0.020, 0.072)	1.026 (0.985, 1.068)	1.025 (0.985, 1.066)	0.516
7	1.02	1.02	-0.005 (-0.062, 0.049)	0.995 (0.952, 1.039)	0.996 (0.954, 1.039)	0.890

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S16. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST among the population with **age 25-44 years**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Age 25-44 years						
week number after ***Spring*** DST						
0	3.22	3.18	0.033 (-0.070, 0.133)	1.010 (0.975, 1.046)	1.004 (0.970, 1.039)	0.830
1	3.16	3.19	-0.028 (-0.131, 0.072)	0.991 (0.956, 1.026)	0.987 (0.954, 1.022)	0.705
2	3.17	3.19	-0.025 (-0.127, 0.073)	0.992 (0.957, 1.027)	0.989 (0.955, 1.023)	0.705
3	3.23	3.20	0.033 (-0.065, 0.129)	1.010 (0.975, 1.046)	1.014 (0.980, 1.049)	0.705
4	3.25	3.21	0.043 (-0.051, 0.134)	1.013 (0.978, 1.048)	1.005 (0.970, 1.040)	0.830
5	3.16	3.22	-0.059 (-0.148, 0.028)	0.981 (0.948, 1.016)	0.986 (0.951, 1.022)	0.705
6	3.11	3.23	-0.114 (-0.198, -0.032)	0.964 (0.931, 0.998)	0.969 (0.936, 1.002)	0.319
7	3.25	3.24	0.009 (-0.070, 0.086)	1.002 (0.969, 1.037)	1.009 (0.975, 1.043)	0.771
week number after ***Fall*** DST						
0	3.25	3.26	-0.009 (-0.094, 0.073)	0.997 (0.963, 1.031)	1.001 (0.968, 1.035)	0.960
1	3.21	3.27	-0.061 (-0.146, 0.022)	0.981 (0.948, 1.015)	0.985 (0.951, 1.019)	0.705
2	3.22	3.28	-0.059 (-0.146, 0.025)	0.982 (0.948, 1.016)	0.986 (0.953, 1.020)	0.705
3	3.22	3.29	-0.062 (-0.153, 0.027)	0.981 (0.947, 1.015)	0.986 (0.954, 1.019)	0.705
4	3.29	3.30	-0.004 (-0.104, 0.093)	0.998 (0.964, 1.033)	1.006 (0.973, 1.040)	0.830
5	3.23	3.31	-0.087 (-0.202, 0.024)	0.973 (0.939, 1.008)	0.979 (0.946, 1.013)	0.701
6	3.29	3.33	-0.043 (-0.181, 0.089)	0.987 (0.951, 1.023)	0.984 (0.950, 1.019)	0.705
7	3.33	3.35	-0.026 (-0.194, 0.134)	0.992 (0.954, 1.030)	0.991 (0.954, 1.029)	0.771

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S17. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST among the population with **age 45-64 years**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Age 45-64 years						
week number after ***Spring*** DST						
0	14.21	14.06	0.149 (-0.073, 0.367)	1.011 (0.993, 1.028)	1.011 (0.995, 1.028)	0.267
1	13.91	14.00	-0.084 (-0.305, 0.134)	0.994 (0.977, 1.011)	0.992 (0.976, 1.008)	0.388
2	13.79	13.93	-0.146 (-0.363, 0.068)	0.989 (0.972, 1.007)	0.992 (0.976, 1.008)	0.370
3	14.00	13.87	0.131 (-0.079, 0.337)	1.009 (0.992, 1.027)	1.013 (0.997, 1.030)	0.210
4	13.73	13.80	-0.072 (-0.271, 0.125)	0.995 (0.978, 1.012)	0.991 (0.975, 1.008)	0.370
5	13.48	13.74	-0.255 (-0.444, -0.069)	0.981 (0.965, 0.998)	0.989 (0.972, 1.006)	0.280
6	13.32	13.68	-0.355 (-0.532, -0.181)	0.974 (0.957, 0.991)	0.978 (0.963, 0.994)	0.030
7	13.51	13.62	-0.108 (-0.273, 0.055)	0.992 (0.975, 1.009)	0.998 (0.982, 1.014)	0.809
week number after ***Fall*** DST						
0	13.56	13.53	0.031 (-0.146, 0.205)	1.002 (0.985, 1.019)	0.997 (0.981, 1.013)	0.734
1	13.57	13.63	-0.051 (-0.231, 0.125)	0.996 (0.979, 1.013)	0.985 (0.968, 1.001)	0.148
2	13.50	13.74	-0.233 (-0.418, -0.051)	0.983 (0.966, 1.000)	0.978 (0.962, 0.994)	0.030
3	13.66	13.86	-0.202 (-0.399, -0.009)	0.985 (0.968, 1.002)	0.986 (0.971, 1.002)	0.180
4	13.92	14.00	-0.074 (-0.293, 0.141)	0.995 (0.978, 1.012)	0.995 (0.979, 1.011)	0.598
5	13.99	14.15	-0.153 (-0.408, 0.098)	0.989 (0.972, 1.007)	0.989 (0.973, 1.005)	0.267
6	14.05	14.31	-0.259 (-0.567, 0.043)	0.982 (0.964, 1.000)	0.982 (0.966, 0.999)	0.101
7	14.18	14.49	-0.315 (-0.693, 0.054)	0.978 (0.959, 0.997)	0.981 (0.963, 0.999)	0.101

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S18. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST among the population with **age 65-74 years**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Age 65-74 years						
week number after ***Spring*** DST						
0	34.76	34.60	0.162 (-0.398, 0.713)	1.004 (0.987, 1.022)	1.006 (0.989, 1.023)	0.594
1	34.19	34.37	-0.179 (-0.737, 0.369)	0.994 (0.977, 1.012)	0.994 (0.977, 1.011)	0.586
2	34.07	34.13	-0.059 (-0.604, 0.478)	0.998 (0.980, 1.015)	1.002 (0.985, 1.019)	0.821
3	34.13	33.89	0.237 (-0.289, 0.754)	1.006 (0.989, 1.024)	1.010 (0.993, 1.028)	0.357
4	33.81	33.65	0.161 (-0.339, 0.653)	1.004 (0.987, 1.022)	1.007 (0.989, 1.024)	0.586
5	33.18	33.40	-0.222 (-0.693, 0.242)	0.993 (0.975, 1.010)	1.003 (0.985, 1.021)	0.802
6	32.85	33.17	-0.314 (-0.754, 0.121)	0.990 (0.973, 1.007)	0.996 (0.979, 1.014)	0.764
7	32.97	32.93	0.043 (-0.368, 0.449)	1.001 (0.983, 1.018)	1.009 (0.992, 1.026)	0.440
week number after ***Fall*** DST						
0	33.30	33.58	-0.280 (-0.731, 0.165)	0.991 (0.974, 1.009)	0.983 (0.966, 0.999)	0.084
1	33.70	33.92	-0.219 (-0.677, 0.232)	0.993 (0.976, 1.010)	0.981 (0.965, 0.999)	0.073
2	33.78	34.28	-0.499 (-0.970, -0.033)	0.985 (0.968, 1.002)	0.977 (0.961, 0.994)	0.023
3	34.07	34.67	-0.601 (-1.104, -0.106)	0.982 (0.965, 0.999)	0.980 (0.964, 0.997)	0.049
4	34.77	35.09	-0.318 (-0.879, 0.234)	0.990 (0.973, 1.008)	0.988 (0.972, 1.005)	0.268
5	34.70	35.53	-0.827 (-1.482, -0.183)	0.976 (0.959, 0.994)	0.974 (0.957, 0.991)	0.010
6	35.23	35.99	-0.762 (-1.554, 0.013)	0.978 (0.960, 0.997)	0.980 (0.963, 0.998)	0.060
7	35.62	36.49	-0.867 (-1.841, 0.082)	0.976 (0.957, 0.995)	0.982 (0.964, 1.001)	0.111

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S19. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST among the population with **age 75-84 years**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Age 75-84 years						
week number after ***Spring*** DST						
0	89.98	90.39	-0.407 (-2.071, 1.226)	0.995 (0.975, 1.015)	0.999 (0.980, 1.017)	0.893
1	89.19	89.56	-0.372 (-2.024, 1.251)	0.996 (0.976, 1.016)	0.996 (0.978, 1.015)	0.780
2	88.41	88.72	-0.301 (-1.914, 1.284)	0.996 (0.976, 1.017)	1.004 (0.985, 1.023)	0.780
3	88.14	87.86	0.281 (-1.271, 1.805)	1.003 (0.983, 1.023)	1.008 (0.989, 1.027)	0.543
4	87.68	87.00	0.685 (-0.788, 2.133)	1.008 (0.988, 1.028)	1.014 (0.994, 1.033)	0.243
5	85.30	86.14	-0.841 (-2.226, 0.521)	0.990 (0.970, 1.010)	1.003 (0.984, 1.023)	0.798
6	84.98	85.30	-0.322 (-1.615, 0.952)	0.996 (0.976, 1.016)	1.004 (0.986, 1.024)	0.780
7	84.19	84.48	-0.289 (-1.496, 0.901)	0.996 (0.976, 1.016)	1.006 (0.987, 1.025)	0.671
week number after ***Fall*** DST						
0	84.81	86.48	-1.669 (-3.008, -0.350)	0.981 (0.961, 1.000)	0.968 (0.950, 0.986)	0.002
1	86.53	87.58	-1.053 (-2.415, 0.288)	0.988 (0.968, 1.008)	0.969 (0.950, 0.988)	0.003
2	86.57	88.76	-2.186 (-3.595, -0.798)	0.975 (0.956, 0.995)	0.963 (0.944, 0.981)	0.001
3	87.21	90.01	-2.806 (-4.313, -1.323)	0.969 (0.949, 0.988)	0.964 (0.947, 0.982)	0.001
4	89.26	91.34	-2.081 (-3.769, -0.424)	0.977 (0.958, 0.997)	0.971 (0.953, 0.989)	0.005
5	90.03	92.75	-2.721 (-4.699, -0.785)	0.971 (0.951, 0.991)	0.965 (0.946, 0.983)	0.001
6	91.78	94.25	-2.465 (-4.862, -0.128)	0.974 (0.953, 0.995)	0.976 (0.957, 0.995)	0.020
7	92.43	95.82	-3.394 (-6.349, -0.527)	0.965 (0.943, 0.987)	0.972 (0.952, 0.993)	0.014

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S20. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST among the population with **age 85 years and older**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Age 85 years and older						
week number after ***Spring*** DST						
0	327.48	329.60	-2.120 (-10.003, 5.578)	0.994 (0.968, 1.020)	0.998 (0.974, 1.023)	0.908
1	330.35	325.73	4.623 (-3.200, 12.262)	1.014 (0.988, 1.041)	1.016 (0.992, 1.041)	0.287
2	321.76	321.75	0.009 (-7.616, 7.458)	1.000 (0.974, 1.026)	1.009 (0.984, 1.034)	0.585
3	316.40	317.73	-1.334 (-8.652, 5.819)	0.996 (0.970, 1.022)	1.006 (0.981, 1.031)	0.709
4	315.27	313.70	1.567 (-5.364, 8.348)	1.005 (0.979, 1.031)	1.009 (0.984, 1.035)	0.585
5	309.07	309.70	-0.627 (-7.125, 5.738)	0.998 (0.972, 1.024)	1.019 (0.992, 1.045)	0.248
6	303.18	305.77	-2.590 (-8.645, 3.348)	0.991 (0.966, 1.018)	1.004 (0.979, 1.030)	0.800
7	299.96	301.95	-1.994 (-7.629, 3.537)	0.993 (0.968, 1.019)	1.009 (0.984, 1.034)	0.585
week number after ***Fall*** DST						
0	302.69	309.35	-6.658 (-12.930, -0.511)	0.979 (0.953, 1.004)	0.966 (0.942, 0.991)	0.016
1	309.88	314.00	-4.117 (-10.525, 2.164)	0.987 (0.962, 1.013)	0.970 (0.945, 0.995)	0.031
2	310.51	318.95	-8.432 (-15.099, -1.901)	0.974 (0.949, 0.999)	0.962 (0.938, 0.986)	0.008
3	313.14	324.19	-11.046 (-18.228, -4.019)	0.966 (0.941, 0.991)	0.963 (0.939, 0.986)	0.008
4	320.27	329.73	-9.461 (-17.565, -1.553)	0.971 (0.946, 0.997)	0.968 (0.944, 0.992)	0.019
5	325.39	335.56	-10.172 (-19.733, -0.876)	0.970 (0.944, 0.996)	0.966 (0.941, 0.990)	0.016
6	329.29	341.69	-12.401 (-24.046, -1.139)	0.964 (0.937, 0.991)	0.964 (0.939, 0.989)	0.015
7	332.56	348.12	-15.556 (-29.969, -1.715)	0.955 (0.927, 0.984)	0.962 (0.935, 0.989)	0.016

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

*S4.4 Supplementary results of subgroup analysis by different **ethnicity groups***

Table S21. Summary of observed and estimated all-cause mortality rate, and aRR pooled for 0-7 weeks after DST, stratified by ethnicity groups.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Hispanic population						
0-7 weeks after Spring DST	6.59	6.65	-0.059 (-0.183, 0.062)	0.990 (0.968, 1.012)	0.991 (0.969, 1.012)	0.340
0-7 weeks after Fall DST	6.87	7.00	-0.135 (-0.287, 0.014)	0.980 (0.958, 1.002)	0.977 (0.956, 0.998)	0.068
0-7 weeks after either DST	6.73	6.83	-0.097 (-0.235, 0.038)	0.985 (0.963, 1.007)	0.984 (0.962, 1.005)	0.152
Non-Hispanic Asian population						
0-7 weeks after Spring DST	7.40	7.40	-0.000 (-0.217, 0.210)	0.998 (0.964, 1.033)	1.005 (0.970, 1.041)	0.864
0-7 weeks after Fall DST	7.70	7.80	-0.099 (-0.367, 0.159)	0.986 (0.952, 1.021)	0.981 (0.947, 1.017)	0.569
0-7 weeks after either DST	7.55	7.60	-0.050 (-0.292, 0.185)	0.992 (0.958, 1.027)	0.993 (0.958, 1.029)	0.701
Non-Hispanic Black population						
0-7 weeks after Spring DST	16.14	16.27	-0.126 (-0.398, 0.141)	0.992 (0.972, 1.012)	0.999 (0.980, 1.018)	0.620
0-7 weeks after Fall DST	16.69	16.79	-0.101 (-0.434, 0.226)	0.994 (0.974, 1.014)	0.989 (0.971, 1.008)	0.432
0-7 weeks after either DST	16.42	16.53	-0.114 (-0.416, 0.183)	0.993 (0.973, 1.013)	0.994 (0.975, 1.013)	0.517
Non-Hispanic White population						
0-7 weeks after Spring DST	21.47	21.45	0.022 (-0.317, 0.356)	1.001 (0.982, 1.020)	1.007 (0.989, 1.025)	0.511
0-7 weeks after Fall DST	21.54	22.14	-0.599 (-1.016, -0.191)	0.973 (0.955, 0.992)	0.969 (0.952, 0.987)	0.002
0-7 weeks after either DST	21.51	21.79	-0.288 (-0.666, 0.083)	0.987 (0.968, 1.006)	0.988 (0.970, 1.006)	0.029
Other population						
0-7 weeks after Spring DST	7.36	7.33	0.025 (-0.222, 0.264)	1.003 (0.964, 1.044)	1.005 (0.964, 1.046)	0.768
0-7 weeks after Fall DST	7.38	7.48	-0.092 (-0.383, 0.188)	0.983 (0.943, 1.024)	0.982 (0.942, 1.024)	0.426
0-7 weeks after either DST	7.37	7.40	-0.033 (-0.302, 0.226)	0.993 (0.954, 1.034)	0.993 (0.953, 1.035)	0.572

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S22. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST among the **Hispanic population**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Hispanic population						
week number after ***Spring*** DST						
0	6.83	6.78	0.045 (-0.092, 0.180)	1.005 (0.983, 1.028)	1.005 (0.983, 1.026)	0.705
1	6.69	6.74	-0.053 (-0.189, 0.082)	0.991 (0.969, 1.013)	0.987 (0.966, 1.008)	0.311
2	6.54	6.71	-0.161 (-0.296, -0.030)	0.975 (0.953, 0.997)	0.976 (0.955, 0.997)	0.065
3	6.61	6.67	-0.063 (-0.192, 0.064)	0.989 (0.968, 1.011)	0.991 (0.970, 1.012)	0.523
4	6.70	6.63	0.067 (-0.056, 0.188)	1.009 (0.987, 1.031)	1.005 (0.983, 1.027)	0.705
5	6.44	6.60	-0.155 (-0.272, -0.041)	0.975 (0.954, 0.997)	0.980 (0.958, 1.003)	0.156
6	6.47	6.56	-0.100 (-0.208, 0.008)	0.983 (0.962, 1.005)	0.987 (0.966, 1.008)	0.311
7	6.48	6.53	-0.055 (-0.157, 0.045)	0.990 (0.969, 1.012)	0.995 (0.974, 1.017)	0.705
week number after ***Fall*** DST						
0	6.62	6.65	-0.032 (-0.144, 0.077)	0.994 (0.973, 1.016)	0.987 (0.966, 1.008)	0.311
1	6.70	6.73	-0.029 (-0.142, 0.082)	0.995 (0.973, 1.016)	0.981 (0.960, 1.003)	0.156
2	6.69	6.82	-0.126 (-0.243, -0.011)	0.980 (0.959, 1.002)	0.974 (0.953, 0.994)	0.044
3	6.72	6.92	-0.199 (-0.324, -0.076)	0.970 (0.949, 0.991)	0.970 (0.950, 0.991)	0.019
4	6.87	7.03	-0.153 (-0.293, -0.016)	0.977 (0.956, 0.999)	0.977 (0.956, 0.997)	0.065
5	7.01	7.15	-0.140 (-0.304, 0.020)	0.979 (0.958, 1.001)	0.978 (0.957, 0.999)	0.084
6	7.05	7.28	-0.237 (-0.437, -0.043)	0.966 (0.944, 0.989)	0.967 (0.945, 0.988)	0.013
7	7.27	7.43	-0.162 (-0.409, 0.078)	0.977 (0.954, 1.001)	0.980 (0.957, 1.003)	0.156

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S23. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST among the **non-Hispanic Asian population**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Non-Hispanic Asian population						
week number after ***Spring*** DST						
0	7.71	7.61	0.100 (-0.143, 0.335)	1.012 (0.977, 1.047)	1.015 (0.981, 1.051)	0.688
1	7.61	7.55	0.057 (-0.184, 0.291)	1.006 (0.972, 1.041)	1.007 (0.972, 1.042)	0.898
2	7.40	7.49	-0.088 (-0.324, 0.140)	0.987 (0.953, 1.022)	0.993 (0.958, 1.028)	0.898
3	7.47	7.43	0.044 (-0.183, 0.264)	1.005 (0.970, 1.040)	1.011 (0.976, 1.047)	0.755
4	7.35	7.37	-0.017 (-0.233, 0.192)	0.996 (0.962, 1.031)	1.001 (0.965, 1.038)	0.955
5	7.25	7.31	-0.061 (-0.264, 0.137)	0.990 (0.956, 1.025)	1.003 (0.966, 1.041)	0.921
6	7.24	7.25	-0.008 (-0.198, 0.177)	0.997 (0.963, 1.032)	1.004 (0.970, 1.040)	0.921
7	7.17	7.20	-0.028 (-0.205, 0.145)	0.995 (0.961, 1.029)	1.003 (0.968, 1.039)	0.921
week number after ***Fall*** DST						
0	7.48	7.37	0.109 (-0.087, 0.300)	1.014 (0.980, 1.048)	1.004 (0.970, 1.039)	0.921
1	7.45	7.47	-0.022 (-0.222, 0.172)	0.996 (0.962, 1.030)	0.981 (0.947, 1.017)	0.681
2	7.41	7.58	-0.169 (-0.375, 0.032)	0.977 (0.944, 1.011)	0.966 (0.932, 1.000)	0.243
3	7.56	7.70	-0.143 (-0.363, 0.070)	0.980 (0.947, 1.014)	0.977 (0.944, 1.010)	0.599
4	7.72	7.84	-0.119 (-0.366, 0.119)	0.984 (0.951, 1.018)	0.980 (0.947, 1.014)	0.618
5	7.79	7.98	-0.190 (-0.479, 0.089)	0.975 (0.941, 1.010)	0.971 (0.937, 1.005)	0.375
6	8.02	8.14	-0.117 (-0.469, 0.220)	0.984 (0.950, 1.021)	0.986 (0.951, 1.022)	0.688
7	8.16	8.31	-0.142 (-0.579, 0.272)	0.982 (0.945, 1.020)	0.987 (0.950, 1.026)	0.755

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S24. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST among the **non-Hispanic black population**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Non-Hispanic Black population						
week number after ***Spring*** DST						
0	16.55	16.62	-0.071 (-0.374, 0.227)	0.995 (0.976, 1.015)	0.996 (0.978, 1.015)	0.755
1	16.37	16.52	-0.150 (-0.452, 0.146)	0.991 (0.971, 1.010)	0.991 (0.972, 1.009)	0.578
2	16.43	16.42	0.012 (-0.284, 0.302)	1.000 (0.981, 1.020)	1.007 (0.988, 1.026)	0.612
3	16.30	16.32	-0.022 (-0.307, 0.259)	0.998 (0.979, 1.018)	1.005 (0.987, 1.024)	0.675
4	16.03	16.22	-0.188 (-0.460, 0.079)	0.988 (0.969, 1.008)	0.993 (0.974, 1.013)	0.612
5	15.93	16.12	-0.192 (-0.448, 0.060)	0.988 (0.968, 1.007)	1.003 (0.983, 1.023)	0.815
6	15.67	16.02	-0.345 (-0.584, -0.109)	0.978 (0.959, 0.998)	0.988 (0.969, 1.007)	0.396
7	15.87	15.92	-0.055 (-0.279, 0.165)	0.996 (0.977, 1.016)	1.008 (0.989, 1.027)	0.612
week number after ***Fall*** DST						
0	16.23	16.21	0.022 (-0.223, 0.263)	1.001 (0.982, 1.021)	0.991 (0.973, 1.010)	0.578
1	16.34	16.36	-0.017 (-0.265, 0.228)	0.999 (0.979, 1.018)	0.984 (0.965, 1.003)	0.235
2	16.50	16.51	-0.011 (-0.268, 0.242)	0.999 (0.980, 1.019)	0.988 (0.970, 1.006)	0.396
3	16.67	16.68	-0.010 (-0.285, 0.261)	0.999 (0.980, 1.019)	0.996 (0.978, 1.014)	0.735
4	16.81	16.86	-0.041 (-0.349, 0.262)	0.997 (0.978, 1.017)	0.993 (0.975, 1.012)	0.612
5	16.83	17.04	-0.214 (-0.575, 0.139)	0.987 (0.967, 1.007)	0.983 (0.965, 1.002)	0.224
6	16.99	17.24	-0.255 (-0.691, 0.170)	0.985 (0.964, 1.006)	0.986 (0.967, 1.005)	0.363
7	17.18	17.45	-0.279 (-0.815, 0.241)	0.984 (0.962, 1.006)	0.992 (0.971, 1.013)	0.612

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

573 Table S25. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after
574 DST among the **non-Hispanic white population**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Non-Hispanic White population						
week number after ***Spring*** DST						
0	22.14	22.10	0.039 (-0.341, 0.414)	1.002 (0.983, 1.021)	1.004 (0.987, 1.022)	0.697
1	22.04	21.91	0.130 (-0.248, 0.502)	1.006 (0.987, 1.025)	1.006 (0.988, 1.023)	0.610
2	21.71	21.73	-0.011 (-0.380, 0.353)	0.999 (0.981, 1.018)	1.005 (0.988, 1.023)	0.636
3	21.69	21.54	0.152 (-0.204, 0.502)	1.007 (0.988, 1.026)	1.013 (0.995, 1.031)	0.232
4	21.53	21.35	0.183 (-0.155, 0.516)	1.008 (0.990, 1.028)	1.010 (0.992, 1.029)	0.386
5	21.07	21.16	-0.094 (-0.412, 0.219)	0.995 (0.977, 1.014)	1.009 (0.990, 1.028)	0.442
6	20.80	20.98	-0.180 (-0.477, 0.113)	0.991 (0.973, 1.010)	1.000 (0.982, 1.018)	0.986
7	20.76	20.80	-0.041 (-0.318, 0.233)	0.998 (0.979, 1.017)	1.009 (0.991, 1.027)	0.442
week number after ***Fall*** DST						
0	20.77	21.13	-0.367 (-0.673, -0.066)	0.983 (0.964, 1.001)	0.973 (0.956, 0.990)	0.005
1	21.10	21.38	-0.282 (-0.593, 0.025)	0.987 (0.969, 1.005)	0.973 (0.955, 0.990)	0.005
2	21.09	21.65	-0.553 (-0.875, -0.236)	0.975 (0.956, 0.993)	0.966 (0.949, 0.983)	0.001
3	21.26	21.93	-0.672 (-1.016, -0.334)	0.969 (0.951, 0.988)	0.967 (0.951, 0.984)	0.001
4	21.75	22.24	-0.493 (-0.878, -0.115)	0.978 (0.959, 0.996)	0.976 (0.959, 0.993)	0.010
5	21.86	22.57	-0.707 (-1.157, -0.265)	0.969 (0.950, 0.988)	0.966 (0.949, 0.983)	0.001
6	22.17	22.92	-0.755 (-1.300, -0.222)	0.967 (0.948, 0.987)	0.968 (0.950, 0.986)	0.001
7	22.34	23.30	-0.963 (-1.635, -0.310)	0.959 (0.939, 0.979)	0.965 (0.946, 0.984)	0.001

575 *Note*: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with
576 adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).
577

Table S26. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST among the **population of other ethnicities**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
Population of other ethnicities						
week number after ***Spring*** DST						
0	7.62	7.47	0.146 (-0.130, 0.412)	1.020 (0.980, 1.061)	1.024 (0.984, 1.066)	0.586
1	7.57	7.43	0.135 (-0.140, 0.400)	1.018 (0.978, 1.059)	1.019 (0.979, 1.060)	0.708
2	7.56	7.39	0.164 (-0.104, 0.424)	1.022 (0.982, 1.063)	1.022 (0.982, 1.064)	0.598
3	7.31	7.35	-0.042 (-0.301, 0.208)	0.994 (0.955, 1.035)	0.998 (0.958, 1.040)	0.951
4	7.34	7.31	0.027 (-0.220, 0.265)	1.004 (0.965, 1.044)	0.997 (0.956, 1.039)	0.951
5	7.21	7.27	-0.064 (-0.296, 0.162)	0.991 (0.952, 1.031)	0.996 (0.955, 1.039)	0.951
6	7.06	7.23	-0.174 (-0.391, 0.038)	0.976 (0.938, 1.015)	0.978 (0.939, 1.019)	0.598
7	7.20	7.19	0.008 (-0.195, 0.206)	1.001 (0.963, 1.041)	1.002 (0.962, 1.043)	0.951
week number after ***Fall*** DST						
0	7.37	7.27	0.097 (-0.125, 0.311)	1.013 (0.974, 1.053)	1.014 (0.975, 1.055)	0.816
1	7.04	7.32	-0.282 (-0.505, -0.065)	0.961 (0.924, 1.000)	0.951 (0.912, 0.991)	0.083
2	7.01	7.38	-0.373 (-0.602, -0.151)	0.949 (0.912, 0.988)	0.950 (0.912, 0.990)	0.083
3	7.38	7.44	-0.060 (-0.302, 0.174)	0.992 (0.953, 1.031)	0.996 (0.957, 1.035)	0.951
4	7.43	7.50	-0.071 (-0.339, 0.188)	0.990 (0.952, 1.030)	0.993 (0.954, 1.033)	0.951
5	7.57	7.56	0.012 (-0.299, 0.311)	1.002 (0.962, 1.043)	1.002 (0.962, 1.043)	0.951
6	7.65	7.63	0.020 (-0.355, 0.377)	1.003 (0.962, 1.046)	1.001 (0.960, 1.044)	0.951
7	7.63	7.70	-0.076 (-0.535, 0.358)	0.955 (0.910, 1.002)	0.954 (0.908, 1.002)	0.239

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

S4.5 Supplementary results of ***sensitivity analysis by different model settings***

Table S27. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST, using **degree of freedom (df) for seasonality at 4**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
All-cause, **df for seasonality at 4**						
week number after ***Spring*** DST						
0	17.43	17.42	0.011 (-0.250, 0.269)	1.001 (0.984, 1.018)	1.003 (0.988, 1.019)	0.735
1	17.32	17.26	0.056 (-0.201, 0.310)	1.003 (0.986, 1.020)	1.003 (0.987, 1.019)	0.784
2	17.09	17.10	-0.011 (-0.264, 0.238)	0.999 (0.982, 1.016)	1.004 (0.988, 1.020)	0.735
3	17.05	16.94	0.118 (-0.132, 0.365)	1.007 (0.990, 1.024)	1.010 (0.994, 1.027)	0.320
4	16.93	16.78	0.152 (-0.099, 0.398)	1.009 (0.992, 1.026)	1.008 (0.991, 1.025)	0.463
5	16.58	16.62	-0.044 (-0.295, 0.204)	0.997 (0.980, 1.015)	1.006 (0.989, 1.024)	0.569
6	16.38	16.47	-0.093 (-0.345, 0.155)	0.994 (0.977, 1.012)	0.998 (0.982, 1.015)	0.841
7	16.39	16.34	0.049 (-0.202, 0.295)	1.003 (0.985, 1.021)	1.009 (0.992, 1.026)	0.420
week number after ***Fall*** DST						
0	16.48	16.60	-0.115 (-0.451, 0.214)	0.993 (0.975, 1.011)	0.979 (0.962, 0.996)	0.029
1	16.72	16.77	-0.051 (-0.411, 0.301)	0.997 (0.979, 1.016)	0.978 (0.960, 0.996)	0.029
2	16.73	16.96	-0.230 (-0.609, 0.140)	0.986 (0.968, 1.005)	0.972 (0.954, 0.990)	0.007
3	16.86	17.17	-0.304 (-0.698, 0.081)	0.982 (0.964, 1.001)	0.974 (0.957, 0.992)	0.012
4	17.22	17.39	-0.169 (-0.578, 0.231)	0.990 (0.972, 1.009)	0.982 (0.964, 0.999)	0.070
5	17.34	17.63	-0.296 (-0.727, 0.125)	0.983 (0.965, 1.002)	0.974 (0.957, 0.992)	0.012
6	17.57	17.90	-0.331 (-0.801, 0.126)	0.981 (0.963, 1.001)	0.977 (0.959, 0.994)	0.021
7	17.71	18.18	-0.470 (-1.009, 0.052)	0.974 (0.955, 0.994)	0.973 (0.954, 0.993)	0.020

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

589 Table S28. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after
590 DST, using **degree of freedom (df) for seasonality at 5**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
All-cause, **df for seasonality at 5**						
week number after ***Spring*** DST						
0	17.43	17.34	0.096 (-0.231, 0.417)	1.005 (0.988, 1.023)	1.003 (0.986, 1.020)	0.796
1	17.32	17.16	0.158 (-0.208, 0.517)	1.009 (0.991, 1.028)	1.002 (0.985, 1.019)	0.837
2	17.09	16.99	0.100 (-0.300, 0.490)	1.006 (0.987, 1.025)	1.003 (0.985, 1.020)	0.796
3	17.05	16.82	0.230 (-0.189, 0.638)	1.014 (0.994, 1.033)	1.009 (0.991, 1.027)	0.471
4	16.93	16.67	0.254 (-0.166, 0.664)	1.015 (0.996, 1.035)	1.007 (0.988, 1.025)	0.626
5	16.58	16.53	0.044 (-0.363, 0.441)	1.003 (0.983, 1.022)	1.005 (0.987, 1.023)	0.738
6	16.38	16.41	-0.024 (-0.405, 0.349)	0.998 (0.980, 1.018)	0.996 (0.979, 1.014)	0.776
7	16.39	16.29	0.099 (-0.247, 0.438)	1.006 (0.987, 1.025)	1.007 (0.990, 1.025)	0.590
week number after ***Fall*** DST						
0	16.48	16.64	-0.159 (-0.617, 0.286)	0.990 (0.971, 1.011)	0.980 (0.962, 0.999)	0.075
1	16.72	16.82	-0.101 (-0.622, 0.403)	0.994 (0.973, 1.015)	0.980 (0.960, 1.000)	0.089
2	16.73	17.01	-0.282 (-0.846, 0.265)	0.984 (0.963, 1.005)	0.974 (0.954, 0.994)	0.035
3	16.86	17.21	-0.351 (-0.934, 0.213)	0.980 (0.959, 1.001)	0.976 (0.957, 0.996)	0.049
4	17.22	17.42	-0.204 (-0.780, 0.353)	0.988 (0.967, 1.010)	0.984 (0.964, 1.003)	0.170
5	17.34	17.65	-0.311 (-0.859, 0.220)	0.982 (0.962, 1.003)	0.976 (0.957, 0.995)	0.035
6	17.57	17.88	-0.315 (-0.845, 0.201)	0.982 (0.963, 1.003)	0.977 (0.959, 0.996)	0.044
7	17.71	18.12	-0.410 (-1.001, 0.162)	0.977 (0.957, 0.998)	0.973 (0.953, 0.993)	0.034

591 *Note*: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with
592 adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).
593

Table S29. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST, using **degree of freedom (df) for long-term trend at 3**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
All-cause, **df for long-term trend at 3**						
week number after ***Spring*** DST						
0	17.43	17.39	0.045 (-0.260, 0.344)	1.001 (0.983, 1.018)	1.003 (0.987, 1.019)	0.804
1	17.32	17.25	0.065 (-0.237, 0.361)	1.002 (0.985, 1.019)	1.002 (0.986, 1.018)	0.844
2	17.09	17.12	-0.028 (-0.323, 0.261)	0.997 (0.979, 1.014)	1.002 (0.986, 1.018)	0.815
3	17.05	16.98	0.078 (-0.207, 0.357)	1.003 (0.986, 1.021)	1.009 (0.992, 1.025)	0.428
4	16.93	16.84	0.090 (-0.181, 0.357)	1.004 (0.987, 1.021)	1.006 (0.989, 1.023)	0.647
5	16.58	16.70	-0.123 (-0.380, 0.130)	0.991 (0.974, 1.009)	1.004 (0.987, 1.022)	0.712
6	16.38	16.57	-0.184 (-0.426, 0.054)	0.988 (0.971, 1.005)	0.996 (0.980, 1.012)	0.712
7	16.39	16.43	-0.048 (-0.276, 0.177)	0.996 (0.979, 1.013)	1.006 (0.990, 1.023)	0.631
week number after ***Fall*** DST						
0	16.48	16.74	-0.251 (-0.506, 0.001)	0.987 (0.970, 1.004)	0.977 (0.961, 0.993)	0.009
1	16.72	16.92	-0.203 (-0.462, 0.053)	0.990 (0.973, 1.007)	0.975 (0.959, 0.992)	0.007
2	16.73	17.12	-0.395 (-0.662, -0.132)	0.979 (0.963, 0.996)	0.969 (0.954, 0.985)	0.001
3	16.86	17.34	-0.480 (-0.762, -0.202)	0.975 (0.958, 0.992)	0.972 (0.956, 0.987)	0.001
4	17.22	17.57	-0.353 (-0.662, -0.048)	0.983 (0.966, 1.000)	0.979 (0.963, 0.995)	0.016
5	17.34	17.82	-0.484 (-0.838, -0.137)	0.976 (0.958, 0.993)	0.971 (0.955, 0.987)	0.002
6	17.57	18.08	-0.519 (-0.938, -0.110)	0.974 (0.956, 0.992)	0.974 (0.957, 0.990)	0.005
7	17.71	18.37	-0.652 (-1.159, -0.160)	0.967 (0.949, 0.987)	0.971 (0.952, 0.991)	0.007

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S30. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST, using **degree of freedom (df) for long-term trend at 5**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
All-cause, **df for long-term trend at 5**						
week number after ***Spring*** DST						
0	17.43	17.59	-0.162 (-0.438, 0.110)	1.001 (0.987, 1.016)	1.002 (0.989, 1.016)	0.849
1	17.32	17.46	-0.143 (-0.416, 0.126)	1.003 (0.988, 1.017)	1.002 (0.989, 1.016)	0.849
2	17.09	17.32	-0.237 (-0.505, 0.026)	0.997 (0.983, 1.012)	1.001 (0.988, 1.015)	0.891
3	17.05	17.19	-0.132 (-0.391, 0.122)	1.004 (0.989, 1.018)	1.008 (0.994, 1.022)	0.393
4	16.93	17.05	-0.121 (-0.369, 0.123)	1.005 (0.990, 1.019)	1.005 (0.991, 1.020)	0.612
5	16.58	16.91	-0.334 (-0.571, -0.101)	0.992 (0.978, 1.006)	1.001 (0.987, 1.016)	0.891
6	16.38	16.78	-0.396 (-0.620, -0.175)	0.988 (0.974, 1.003)	0.994 (0.980, 1.008)	0.569
7	16.39	16.65	-0.260 (-0.473, -0.050)	0.997 (0.982, 1.011)	1.004 (0.990, 1.018)	0.765
week number after ***Fall*** DST						
0	16.48	16.84	-0.350 (-0.595, -0.109)	0.988 (0.974, 1.002)	0.981 (0.967, 0.994)	0.010
1	16.72	17.01	-0.295 (-0.546, -0.047)	0.991 (0.977, 1.005)	0.978 (0.965, 0.992)	0.006
2	16.73	17.21	-0.479 (-0.741, -0.222)	0.980 (0.966, 0.994)	0.973 (0.959, 0.986)	<0.001
3	16.86	17.42	-0.557 (-0.834, -0.283)	0.975 (0.961, 0.989)	0.974 (0.960, 0.987)	<0.001
4	17.22	17.64	-0.422 (-0.725, -0.124)	0.983 (0.969, 0.997)	0.980 (0.967, 0.994)	0.010
5	17.34	17.88	-0.546 (-0.887, -0.210)	0.976 (0.961, 0.990)	0.973 (0.959, 0.987)	0.001
6	17.57	18.14	-0.573 (-0.970, -0.185)	0.974 (0.959, 0.989)	0.974 (0.960, 0.988)	0.001
7	17.71	18.41	-0.698 (-1.168, -0.240)	0.968 (0.952, 0.984)	0.973 (0.957, 0.990)	0.004

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S31. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST, using **linear effects for all meteorological variables**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
All-cause, **linear effects for all meteorological variables**						
week number after ***Spring*** DST						
0	17.43	17.42	0.011 (-0.266, 0.284)	1.001 (0.983, 1.018)	1.002 (0.986, 1.018)	0.935
1	17.32	17.28	0.033 (-0.242, 0.305)	1.002 (0.985, 1.019)	1.001 (0.985, 1.017)	0.973
2	17.09	17.14	-0.058 (-0.327, 0.208)	0.997 (0.979, 1.014)	1.001 (0.985, 1.017)	0.973
3	17.05	17.00	0.050 (-0.209, 0.306)	1.003 (0.986, 1.020)	1.006 (0.990, 1.023)	0.624
4	16.93	16.86	0.065 (-0.182, 0.308)	1.004 (0.986, 1.021)	1.004 (0.987, 1.020)	0.822
5	16.58	16.72	-0.146 (-0.378, 0.083)	0.991 (0.974, 1.009)	1.001 (0.984, 1.017)	0.973
6	16.38	16.59	-0.205 (-0.422, 0.009)	0.988 (0.971, 1.005)	0.994 (0.978, 1.010)	0.624
7	16.39	16.45	-0.067 (-0.269, 0.133)	0.996 (0.979, 1.013)	1.004 (0.988, 1.020)	0.822
week number after ***Fall*** DST						
0	16.48	16.70	-0.218 (-0.441, 0.001)	0.987 (0.970, 1.004)	0.979 (0.963, 0.995)	0.017
1	16.72	16.89	-0.170 (-0.396, 0.054)	0.990 (0.973, 1.007)	0.975 (0.959, 0.991)	0.005
2	16.73	17.09	-0.362 (-0.596, -0.131)	0.979 (0.962, 0.996)	0.972 (0.956, 0.987)	0.002
3	16.86	17.31	-0.446 (-0.696, -0.199)	0.974 (0.957, 0.991)	0.973 (0.958, 0.989)	0.002
4	17.22	17.54	-0.319 (-0.599, -0.044)	0.982 (0.965, 0.999)	0.979 (0.964, 0.995)	0.019
5	17.34	17.79	-0.451 (-0.779, -0.129)	0.975 (0.957, 0.992)	0.972 (0.956, 0.988)	0.002
6	17.57	18.05	-0.487 (-0.884, -0.098)	0.973 (0.955, 0.991)	0.974 (0.957, 0.990)	0.005
7	17.71	18.33	-0.621 (-1.110, -0.145)	0.966 (0.947, 0.985)	0.970 (0.951, 0.989)	0.005

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

Table S32. Summary of observed and estimated all-cause mortality rate, and week-specific aRR after DST, detecting the effects for **0-8 weeks after DST**.

	weekly mortality rate, / 100 000			rate ratio (95% CI)		*p*-value for aRR
	observation	baseline	difference	crude	adjusted	
All-cause, **0-8 weeks after DST**						
week number after ***Spring*** DST						
0	17.43	17.47	-0.040 (-0.303, 0.218)	0.998 (0.980, 1.015)	1.000 (0.984, 1.016)	0.982
1	17.32	17.34	-0.022 (-0.281, 0.233)	0.999 (0.981, 1.016)	0.999 (0.983, 1.015)	0.982
2	17.09	17.20	-0.114 (-0.365, 0.133)	0.993 (0.976, 1.011)	1.000 (0.984, 1.016)	0.982
3	17.05	17.06	-0.005 (-0.245, 0.232)	1.000 (0.982, 1.017)	1.006 (0.990, 1.023)	0.683
4	16.93	16.91	0.013 (-0.215, 0.238)	1.001 (0.983, 1.018)	1.004 (0.987, 1.021)	0.830
5	16.58	16.77	-0.193 (-0.408, 0.019)	0.988 (0.971, 1.006)	1.003 (0.986, 1.020)	0.910
6	16.38	16.63	-0.246 (-0.448, -0.047)	0.985 (0.968, 1.002)	0.995 (0.978, 1.011)	0.751
7	16.39	16.45	-0.067 (-0.269, 0.133)	0.996 (0.979, 1.013)	1.006 (0.990, 1.022)	0.667
8	16.21	16.29	-0.084 (-0.286, 0.116)	0.989 (0.972, 1.006)	0.995 (0.979, 1.012)	0.724
week number after ***Fall*** DST						
0	16.48	16.68	-0.193 (-0.417, 0.027)	0.988 (0.971, 1.006)	0.980 (0.963, 0.996)	0.035
1	16.72	16.85	-0.130 (-0.353, 0.090)	0.992 (0.975, 1.010)	0.979 (0.962, 0.996)	0.030
2	16.73	17.03	-0.304 (-0.526, -0.084)	0.982 (0.965, 1.000)	0.974 (0.957, 0.990)	0.006
3	16.86	17.23	-0.366 (-0.593, -0.142)	0.979 (0.962, 0.996)	0.976 (0.961, 0.992)	0.010
4	17.22	17.54	-0.319 (-0.599, -0.044)	0.982 (0.965, 0.999)	0.979 (0.964, 0.995)	0.018
5	17.34	17.63	-0.296 (-0.727, 0.125)	0.983 (0.965, 1.002)	0.974 (0.957, 0.992)	0.012
6	17.57	17.90	-0.331 (-0.801, 0.126)	0.981 (0.963, 1.001)	0.977 (0.959, 0.994)	0.021
7	17.71	18.37	-0.652 (-1.159, -0.160)	0.966 (0.949, 0.987)	0.971 (0.952, 0.991)	0.007
8	18.21	18.70	-0.496 (-0.984, -0.031)	0.972 (0.948, 0.995)	0.979 (0.957, 1.004)	0.188

Note: The "*p*-value for aRR" in the last column was calculated from two-tailed Wald's test with adjustment using Benjamini-Hochberg (BH) procedure for controlling false discovery rate (FDR).

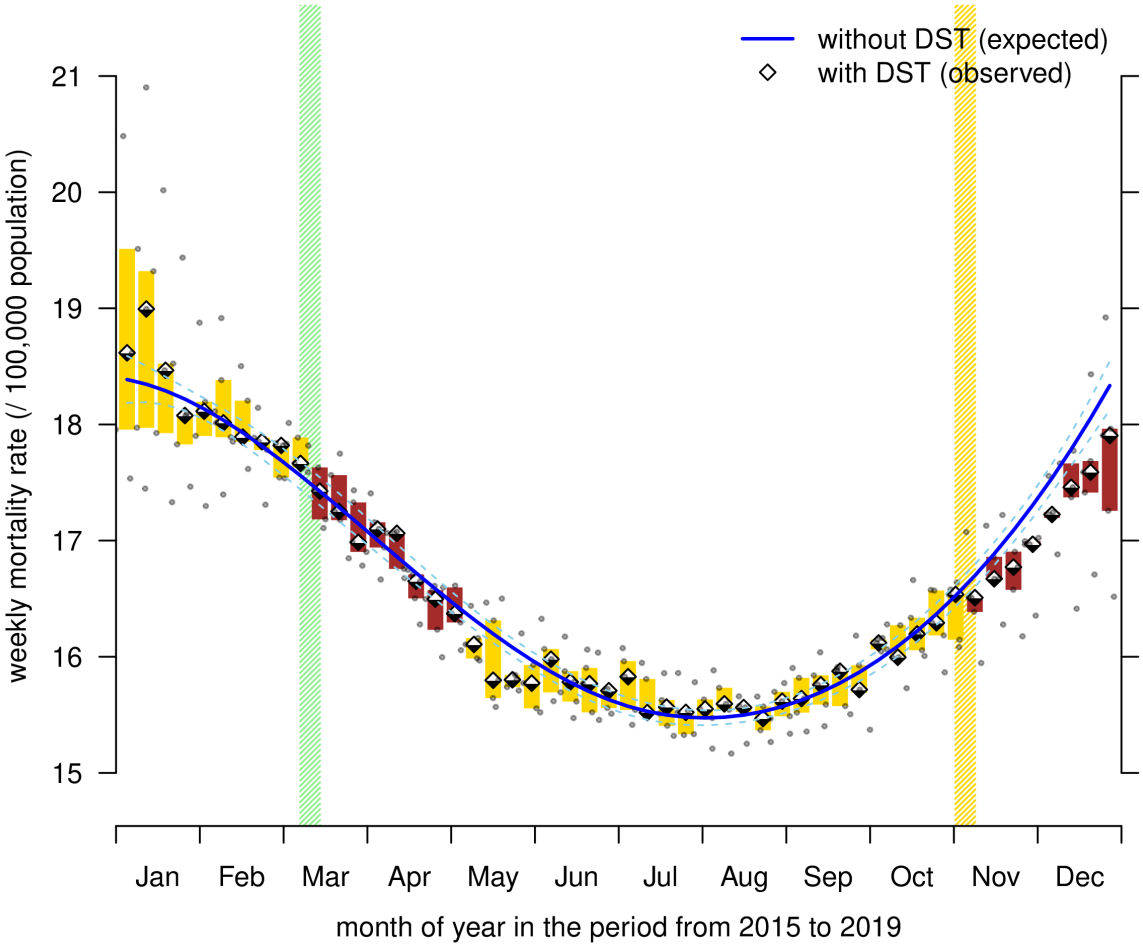


Figure S1. The observed and expected weekly all-cause mortality rates in the US, using regression model trained by partial dataset **excluding 0-7 weeks after DST**.

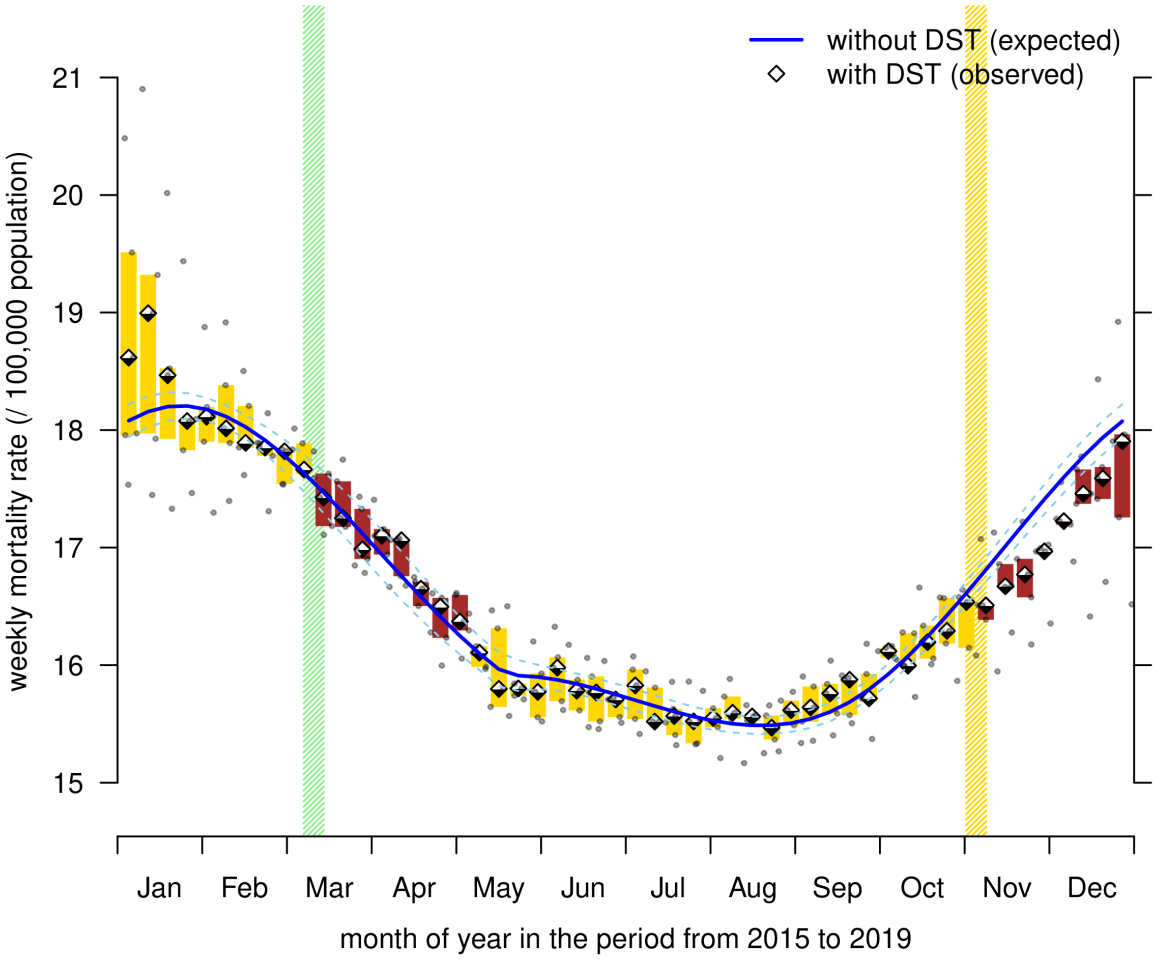


Figure S2. The observed and expected weekly all-cause mortality rates in the US, with **seasonality function indexed in May** of each year.

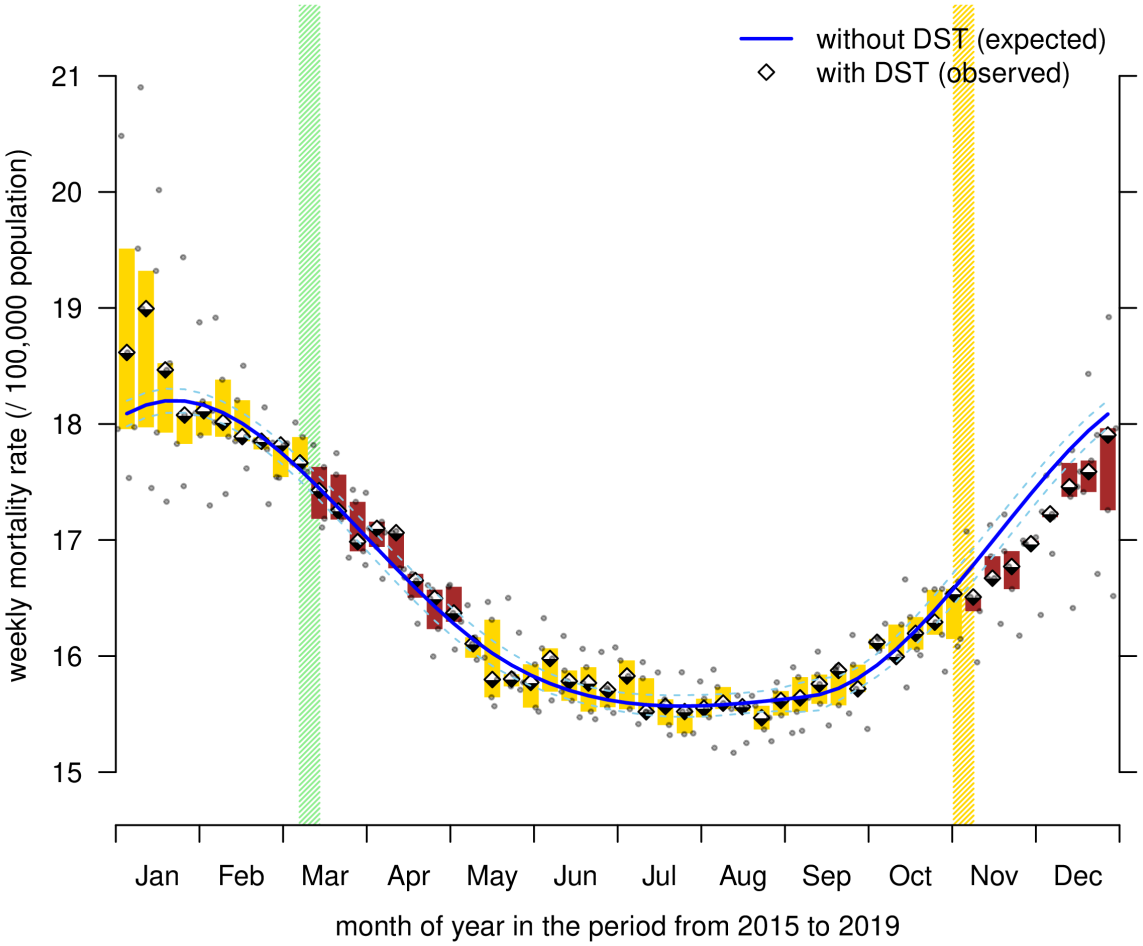


Figure S3. The observed and expected weekly all-cause mortality rates in the US, with **seasonality function indexed in September** of each year.

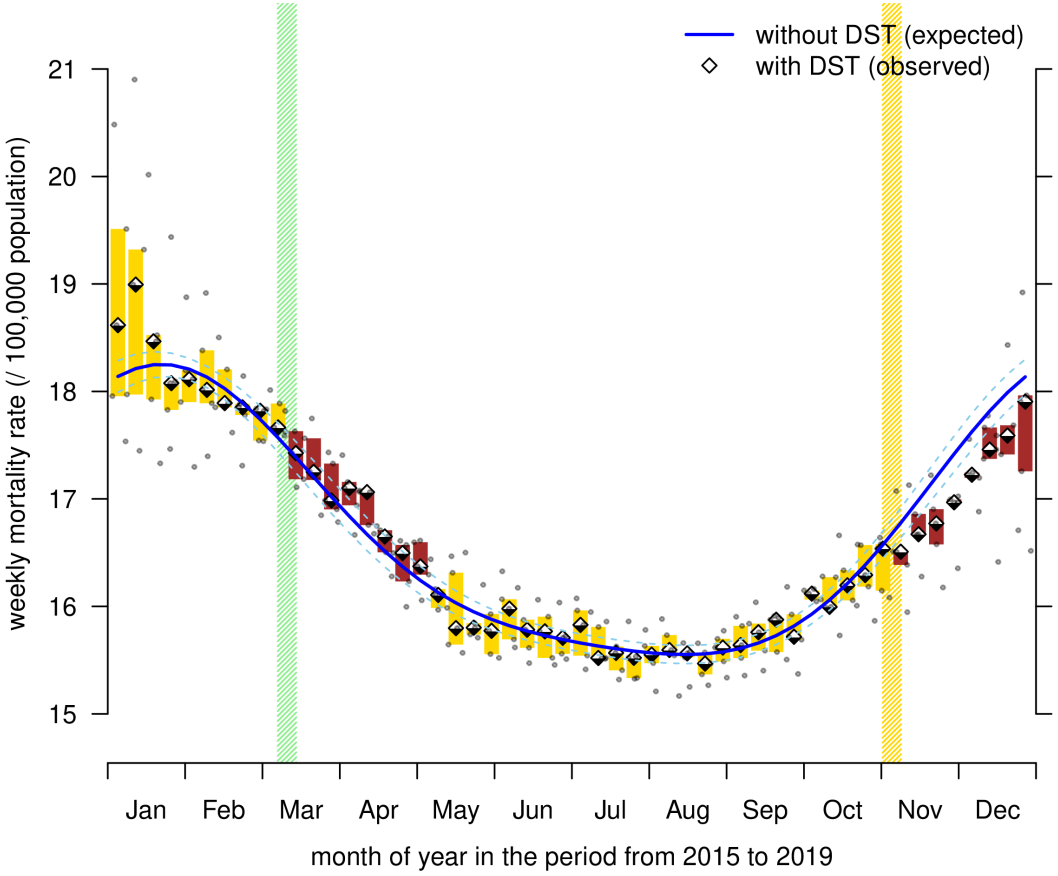


Figure S4. The observed and expected weekly all-cause mortality rates in the US, with **seasonality function adjusted by harmonic functions**.

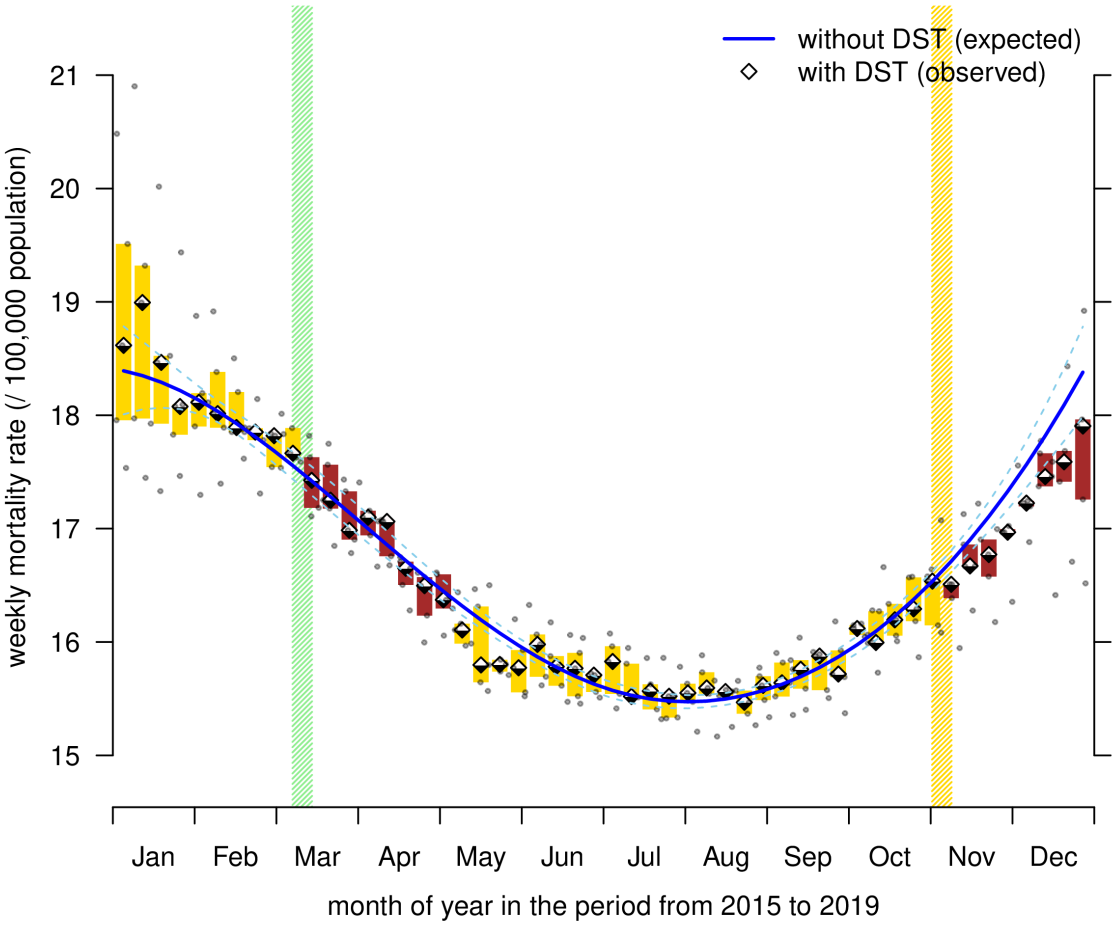
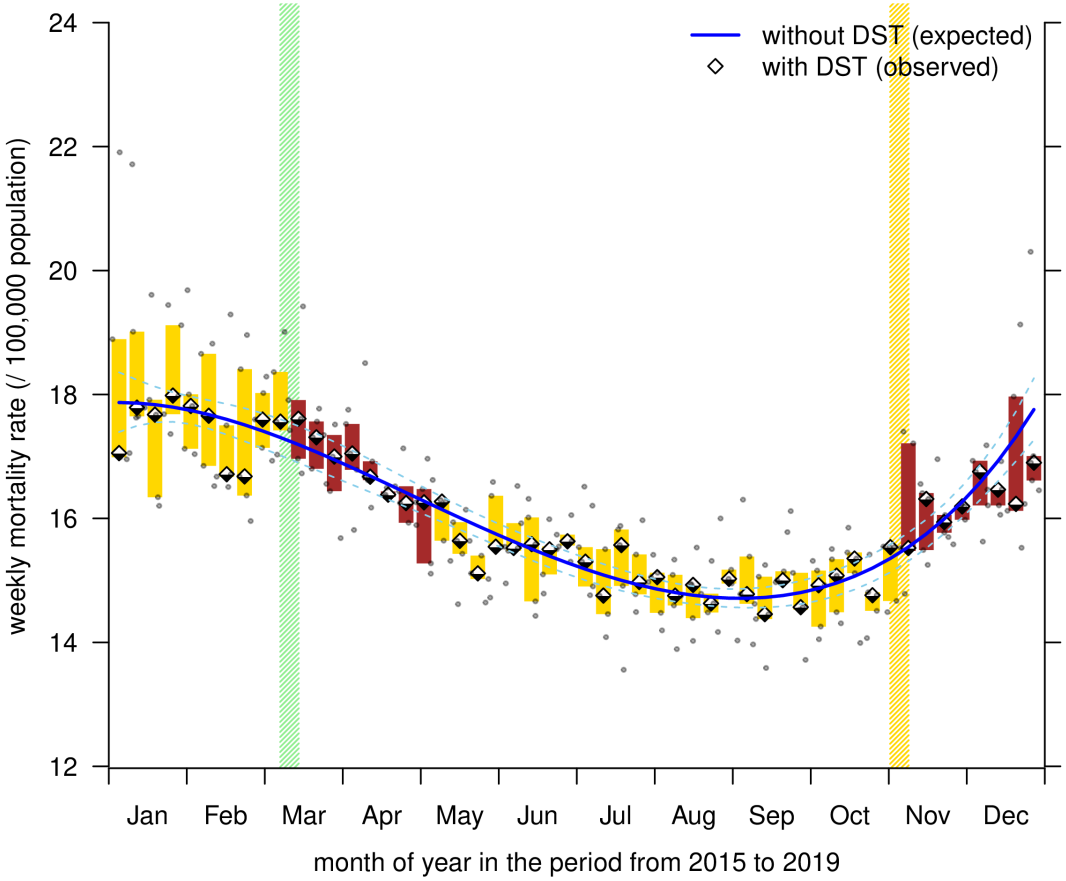


Figure S5. The observed and expected weekly all-cause mortality rates in the US, using regression model trained by partial dataset **excluding January** of each year.



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635 Figure S6. The observed and expected weekly all-cause mortality rates in **Arizona** state.

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