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Supplemental Material

Temperature, Crime, and Violence: A Systematic Review and Meta-Analysis

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Figure S3. Contour-enhanced funnel plot analysis on the detection of publication bias in the meta-analysis of the short-term association between temperature and assault and homicide (A and B for assault and homicide, respectively) and C for long-term homicide, with background color indicating the significance of the studies ($P \geq 0.05$: white background; $P < 0.05$: dark blue; $P < 0.025$: blue; $P < 0.01$: light blue).

References

Table S1. Search strategies and initial results for systematic literature review of the association between temperature, crime and violence, organized by database

#	Query	# of identified articles
Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review, and Other Non-Indexed Citations (1946 to November 6, 2023)		
1	(crime* or criminal* or criminolog* or violen* or gun or guns or gunshot* or homicide* or burglar* or robber* or theft* or aggression or bullying or firearm* or imprison* or riot* or assault* or pedophil* or paedophil* or manslaughter* or misdemeano* or felon*).mp.	253,723
2	exp violence/ or "Wounds and Injuries"/ or firearms/ or Wounds, Gunshot/	209,468
3	judgement/ or social perception/	45,352
4	crime/ or homicide/ or theft/ or aggression/ or bullying/	74,276
5	prisons/ or prisoners/	25,278
6	(prison* or incarcerat*).mp.	42,262
7	(climat* or temperature* or thermal* or heat* or weather).mp.	1,554,405
8	weather/ or extreme weather/ or exp temperature/	463,373
9	(1 or 2 or 3 or 4 or 5 or 6) and (7 or 8)	7,632
10	animals.sh.	7,342,130
11	humans.sh.	21,566,059
12	10 not 11	5,133,194
13	9 not 12	6,724
Web of Science Core Collection (1891 to November 6, 2023)		
TOPIC (crime* or criminal* or criminolog* or violen* or gun or guns or gunshot* or homicide* or burglar* or robber* or theft* or aggression or bullying or firearm* or imprison* or riot* or assault* or pedophil* or paedophil* or manslaughter* or misdemeano* or felon* or prison* or incarcerat*) and TOPIC (climat* or temperature* or heat* or weather)		11,254

Table S2. Criteria for the risk of bias assessment for included studies, adapted from the Office of Health Assessment and Translation (OHAT), for systematic literature review of the association between temperature, crime and violence[1]

Bias	Domains	Ratings	
Key Criteria	Detection bias, exposure assessment	**Can we be confident in the exposure characterization?**	
		Low	There is direct evidence that the exposure was consistently assessed using direct measurements from the monitoring station or using a universally used modeled exposure dataset (e.g., MODIS, gridMET) with a low risk of exposure misclassification. (e.g., assessed exposure at a daily level using a validated data source).
		Probably low	There is indirect evidence that exposure was consistently assessed using direct measurements from the monitoring station or using a universally used modeled exposure dataset (e.g., MODIS, gridMET) with a low risk of exposure misclassification. (e.g., assessed exposure using a validated data source but did not explicitly state the validation).
		Probably high	There is indirect evidence that the exposure was assessed not using direct measurements from the monitoring station or modeled dataset, which could introduce a high risk of exposure misclassification (e.g., exposure assessment was based on a yearly average and did not account for time-varying temperature exposure) OR There is insufficient information provided about the exposure assessment, including validity and reliability, but no evidence for concern about the method used.
		High	There is direct evidence that the exposure was assessed using methods with poor validity and evidence of exposure misclassification.
	Detection bias, outcome assessment	**Can we be confident in the outcome assessment?**	
		Low	There is direct evidence that the outcome data are from a reliable data source (providing a specific link or citing the data source) and defined based on the same standard diagnosis criteria (e.g., police department using the same definition). Studies provide evidence of quality assurance of outcome data.
		Probably low	There is indirect evidence that the outcome was assessed from a reliable data source and defined based on similar standard diagnosis criteria (e.g., Studies aggregating different definitions of crime using various cities/countries). It is deemed that the outcome assessment methods used would not appreciably bias results (e.g., no direct evidence that the date of crime/violence was correctly recorded and not falsified).

		Probably high	There is indirect evidence that the outcome assessment method is an insensitive instrument. OR There is insufficient information provided to judge that crime/violence was correctly recorded.
		High	There is direct evidence that the outcome assessment method is an insensitive instrument. Outcome data stem from unofficial sources (e.g. unofficial reports), which are very likely to show inaccurate data.
	Confounding bias	**Did the study design or analysis account for important confounding and modifying variables?**	
		Low	The study accounted for all important confounders, which were measured consistently (e.g., time trend and season, day of the week, air pollution, latitude, and public holiday) in the final analyses through the use of statistical models to reduce research-specific bias. There is direct evidence that primary covariates and confounders were assessed using valid and reliable measurements.
		Probably low	The study accounted for most of the important confounders (e.g., time trend and season, day of the week, air pollution, latitude, and public holiday) AND is not expected to introduce bias.
		Probably high	The study accounted for some but not all confounders (e.g., only the time trend) AND is expected to introduce bias.
		High	The study did not account for potential confounders OR were inappropriately measured.
Other criteria	Selection bias	**Did the selection of study participants appropriate?**	
		Low	The descriptions of the studied population were sufficiently detailed to support the assertion that the risk of selection effects was minimal (e.g., study participants in different exposure levels and with all outcomes had equal opportunity to be included in the study).
		Probably low	There is insufficient information about population selection to permit a judgment of a low risk of bias, but there is indirect evidence that suggests a low risk of bias (e.g., study participants in different exposure levels may not have equal opportunity to be in the study).
		Probably high	There is insufficient information about population selection to permit a judgment of a high risk of bias, but there is indirect evidence that suggests high risk of bias (e.g., participants in all exposure levels did not have equal opportunity to be in the study, but not to the extent that seriously bias the effect estimates).
		High	There were indications from descriptions of the studied population of high risk of bias (study only included designated high-risk participants, and

			participants in all exposure levels did not have equal opportunity to be in the study, to the extent that effect estimates were seriously biased) (e.g. plots of time series showing unusual patterns).
	Attrition/exclusion bias	**Were outcome data complete without attrition or exclusion from analysis?**	
		Low	No missing data irrelevant to the true study outcome and no missing outcome data.
		Probably low	Though there was not sufficient information available to evaluate the incomplete data's risk accurately, there was indirect evidence indicating a low risk of bias.
		Probably high	Inadequate information was provided to determine whether a risk was high due to incomplete data, but there was indirect evidence to suggest a high risk.
		High	Direct evidence to suggest that the missing data on outcomes is relevant to the true study outcome.
	Selective reporting bias	**Did the study report all measured outcomes?**	
		Low	The study reported findings on all pre-specified outcomes. This would include outcomes reported with sufficient detail to be included in meta-analysis or fully tabulated during data extraction and analyses had been planned in advance.
		Probably low	Inadequate information was provided to determine whether a risk of selective outcome was low, but there was indirect evidence to suggest that the study was not selectively reported.
		Probably high	Inadequate information was provided to determine whether a risk of selective outcome was low, but there was indirect evidence to suggest that the study was selectively reported.
		High	The study did not report findings on all pre-specified outcomes, or used methods that were not pre-specified to analyze one/more of the primary outcomes or report the outcomes/findings that were not pre-specified.
	Conflict of interest	**Was there potential bias in the reporting through financial sources?**	
		Low	No funding was received for this study from entities with a financial interest in the study outcomes.
		Probably low	Inadequate information provided to determine a low risk, but there was indirect evidence to suggest that the study had no financial interest.
		Probably high	Inadequate information provided to determine a low risk, but there was indirect evidence to suggest that the study had financial interest.
		High	Support was received for this study from entities with a financial interest in the study outcomes.
	Other sources of bias	**Bias from other sources not covered elsewhere (statistical methodological appropriateness, researcher compliance with study protocol)**	
		Low	No other sources of bias.

		Probably low	Inadequate information provided to determine a low risk, but there was indirect evidence to suggest that the study had no other problems.
		Probably high	Inadequate information provided to determine a low risk, but there was indirect evidence to suggest that the study had other problems
		High	At least one important bias detected from other sources.

Table S3. Summary of the included studies for systematic literature review of the association between temperature, crime and violence

Author/Publication	Location	Study period	Study season	Exposure temporal scale	Exposure methods	Outcome	Statistical model	Estimates (for 1°C unless otherwise specified)
Algahtany, Kumar et al. 2022[2]	2 provinces in Saudi Arabia	2004-2010	all season	monthly	monitors	Assault, theft, homicide, sexual assault, alcohol, and drug	Multiple regression models	Effect estimates of 0.739 (standard error (se): 0.347) and 2.275 (se: 0.649) for temperature and assault in Makkah and Riyadh, respectively.
Annan-Phan and Ba 2023[3]	U.S.	2000-2016	all season	monthly	modeled	Violent crimes, number of assaulted officers, and civilian deaths	Poisson regression model	Violent crimes and the number of officers assaulted or killed increase on warmer days (≥17◦C).
Auliciems and DiBartolo 1995[4]	Brisbane, Australia	1992	all season	daily	monitors	Number of police calls	Poisson regression model	Effect estimates of 0.46 for number of police calls and maximum air temperature during all seasons.
Baryshnikova, Davidson et al. 2022[5]	4 cities in USA	2014-2017	all season	hourly	monitors	Violent crime and property crime	Linear regression model	Effect estimates of 0.009 (se: 0.001) and 0.006 (se: 0.001) for temperature and violent crime and property crime, respectively.
Berman, Bayham et al. 2020[6]	436 counties in USA	2000-2013	all season	daily	modeled	Violent crime and property crime	Two-stage hierarchical model	Each 10 °C increase in daily mean temperature is

								associated with an 11.92% (95% PI: 11.57, 12.27) and 6.14% (95% PI: 5.88, 6.4) relative risk increase in violent crime and property crime, respectively.
Bollfrass and Shaver 2015[7]	South Africa	1989-2008	all season	annually	modeled	Civil war	Conditional logistic regression, Bayesian logistic regression, and generalized additive mixed-effects regression	Effect estimates of 0.076 (se:0.011) for temperature and civil war.
Butke and Sheridan 2010[8]	Cleveland Ohio, USA	1999-2004	summer (June-August)	daily	monitors	Violent crime	Linear regression model	Slop of 2.74 (mean: 64.25) for all aggressive crime counts with apparent temperature.
Castle and Kovacs[9]	North Bay, Ontario, Canada	2015-2019	all season	daily	monitors	Property and violent crime	Poisson regression model	Effect estimates of 0.0015 for assaults and 0.0194 for thefts.
Chambru 2020[10]	Duchy of Savoy, Western Europe	1749-1792	all season	daily	modeled	Violent crime and property crime	Multiple regression models	A one standard deviation (5.96) increases in temperature shock increased the incidence of property crimes by 6.9% (se: 0.039) and

								effect estimates of -0.087 (se: 0.039) for violent crime.
Churchill, Smyth, and Trinh 2023[11]	Australia	2001-2019	all season	monthly	satellite	Total crime, property crime, and violent crime	Multiple regression models	Effect estimates of 0.011 (se: 0.004) for total crime, 0.007 (se: 0.006) for violent crime, and 0.010 (se: 0.005) for property crime with temperature shock.
Cohn and Rotton 2000[12]	Minneapolis, USA	1987-1988	all season	daily	monitors	Property crime	Hierarchical model and ordinary least squares regression	Effect estimates of 0.2 (b: 0.066), 0.3 (b: 0.058), and 0.2 (b: 0.002) for temperature and theft, burglary, and robbery, respectively.
Corcoran and Zahnow 2021[13]	Brisbane and Queensland, Australia	2010-2012	all season	daily	monitors	Assault	Negative binomial multilevel regression	Incident rate ratio for daily propensity of assaults of 1.02 (se: 0.003).
Cruz, D'Alessio et al, 2023[14]	Cleveland, Ohio, USA	2016	all season	daily	monitors	Violent crime	Autoregressive integrated moving average (ARIMA) model	Effect estimates of 0.125 (T value: 12.675) for maximum daily temperature and violent crime.
DeFronzo 1984[15]	142 largest American Metropolitan Areas in USA	1970-1977	all season	annually	monitors	Violent crime and property crime	Multiple regression model	Number of days with temperature above 32.2°C (90°F) had positive associations with homicide and burglary rates.

FIELD 1992[16]	England and Whales, UK	monthly: 1977-1987, quarterly: 1969-1988, annual: 1947-1987	all season	monthly, annually	monitors	Sexual offence, burglary, theft, and property crime	Linear regression model	Effect estimates of 0.012 (se: 0.0021) for violent crime and temperature.
Gamble and Hess 2012[17]	Dallas, Texas, USA	1993-1999	all season	daily	monitors	Assault, murder, and rape	Ordinary Least Squares regression model	Daily mean ambient temperature had a positive relationship with crime beyond temperatures of 80°F and then turned negative beyond 90°F.
Gates, Klein et al. 2019[18]	South Africa	1997-2013	all season	daily	monitors	Homicide	Conditional logistic regression	Odds ratio for homicide is 1.021 (95% CI: 1.017, 1.024) for lag 0 mean temperature.
Heilmann, Kahn et al. 2021[19]	Los Angeles, California, USA	2010-2017	all season	daily	monitors	Violent crime, property crime, domestic, and intimate partner violence	Poisson regression model	Days with 75°F maximum temperature experience 1.72% more crime than the days that were not.
Hodgkinson, Corcoran et al. 2023[20]	Queensland, Australia	2008-2019	all season	daily	monitors	Violent crime	Negative binomial regression model	Effect estimates of 0.024 (se: 0.015) for association between violent crime and temperature trend in arid regions.
Hou, Zhang et al. 2023[21]	Chicago in Illinois, USA	2011-2017	all season	daily	monitors	Urban crime	Generalized additive model (GAM)	Relative risk (5.2◦C vs 97.5th percentile (27.5◦C)) of 1.36 (95% CI: 1.31, 1.42)

								non-domestic urban crime (UC) risk.
Hu, Wu et al. 2017[22]	Tangshan, China	2009-2014	all season	monthly	modeled	Homicide, assault, rape, robbery, burglary, and motor vehicle theft	Linear regression model	There were strong positive correlations between temperature and both violent and property crimes.
Jung, Kim et al. 2020[23]	Seoul, South Korea	2015	all season	weekly	monitors	Assault	Generalized linear mixed models	1°C increase in weekly mean temperature was associated with a 1.1% increase in weekly assault counts (Odds Ratio (OR): 1.101 (95% CI: 1.09, 1.11)).
Jung, Chun et al. 2020[24]	Seoul, South Korea	2014-2016	all season	monthly	monitors	Assault	Poisson regression model	Effect estimates of 0.0077 (Lower and Upper: 0.0030, 0.0122) for association between monthly temperature and assault.
Kim, Kim et al 2023[25]	Seoul, South Korea	1991-2020	all season	daily	monitors	Assault deaths	Time-stratified case-crossover analysis	Odds ratio of 1.025 (95% CI: 1.005, 1.045) for assault deaths in warm season.
Le, Berman et al. 2022[26]	Hanoi, Vietnam	2013-2019	all season	daily	monitors	Violent crime and property crime	Quasi-Poisson regression with distributed lag non-linear models (DLNMs)	Percentage increases for each 5◦C increase in temperature is 10.4 (95% CI: 0.7, 21.1) and 7.08 (95% CI: 0.7, 13.7) for violent

								crime and non-violent crime, respectively.
Lemon and Partridge 2017[27]	Dorset, UK	2014-2016	all season	daily	monitors	Assault	Negative binomial regression	Relative risk increases for each 1◦C increase in temperature is 1.01 (95% CI: 1.00, 1.02) for assault.
Li, Feng et al. 2023[28]	140 countries and regions	2000-2019	all season	annual	modeled	Homicide (total, female, and male) defined interpersonal violence as homicide	Ordinary least squares regression model	Effect estimates of 0.021 (se: 0.01) for homicide rates.
Linning, Andresen et al. 2017[29]	Vancouver and Ottawa, Canada	2003-2013 (Vancouver), 2006-2008 (Ottawa)	all season	daily, monthly	monitors	Violent crime	Ordinary least squares regression model and negative binomial regression model	Study locations with greater variations in weather throughout the year have more distinct increases of property offences in the summer months.
Linning, Andresen et al. 2017b[30]	8 cities in British Columbia, Canada	2000-2006	all season	monthly	monitors	Assault, robbery, and motor vehicle theft	Negative binomial and Poisson regression model	Temperature changes impacted assault levels and property crimes.
Lynch, Stretesky et al. 2020[31]	New York, USA and London, UK	1985-2015	all season	annually	monitors	Homicide	Ordinary Least Squares regression model	There was a positive correlation between annual homicide rates and temperature.
Lynch, Stretesky et al. 2022[32]	15 cities, USA	2002-2015	all season	annually	monitors	Homicide, rape, robbery,	Pearson's correlation	There was no significant

						assault, burglary, theft, motor vehicle theft, and arson		correlation between crime and temperature.
Lyons, Gause et al. 2022[33]	100 cities, USA	2015-2020	all season	daily	monitors	Firearm violence	Distributed lag nonlinear model	Attributable risk of 6.85 (95% CI: 6.09, 7.46) for shooting.
Mapou, Shendell et al. 2017[34]	Chicago, Houston, Philadelphia, and Seattle, USA	2009-2013	all season	daily	monitors	Assault, burglary, homicide, motor vehicle theft, robbery, and theft	Poisson regression model	Risk ratio for assault of 1.7 (95% CI: 1.32, 2.18), burglary of 1.12 (0.79, 1.6), homicide of 1.85 (0.47, 7.31), and motor vehicle theft of 0.26 (0.17, 0.39) for increase in IQR temperature (18.6◦C).
Mares 2013[35]	St. Louis, Missouri, USA	1980-2010	all season	monthly	monitors	Violent crime	Negative binomial regression model	The most disadvantaged group experience about 36% more violent crimes in the warmest months compared to the coldest month.
Mares 2013b[36]	St. Louis, Missouri, USA	1990-2009	all season	monthly	monitors	Violent crime and property crime	Maximum likelihood estimation and Q-test	Predicted rate of 0.729% increase per 1 degree Fahrenheit for homicide.
Mares and Moffett 2016[37]	57 countries	1995-2012	all season	annually	monitors	Homicide	Multilevel models (MLMs)	1◦C increase in annual temperatures was associated with a nearly 6 % (se: 0.0115) average increase in

								homicides for all nations, effect estimates of 0.164 (se: 0.0872) for Africa, 0.043 (se: 0.043) for Latin America, 0.018 (se: 0.03) for Asia, 0.018 (se: 0.014) for Europe, and 0.028 (se: 0.008) for North America.
Mares and Moffett 2019[38]	multiple cities and counties in USA	1960-2013	all season	monthly	monitors	Homicide, rape, robbery, assault, burglary, and larceny	Negative binomial regression model	The study results predict a nearly 1% increase in crime levels for each degree Celsius temperatures rise above monthly average temperature.
Maystadt, Calderone et al. 2014[39]	Sudan, North Africa	1997-2009	all season	quarterly	modeled	Conflict	Negative binomial regression model	Temperature anomalies were predicted to strongly affect the risk of conflict.
McLean 2007[40]	Manchester, UK	2002	all season	daily	monitors	Sexual assault	Spearman correlation and linear regression	Effect estimates of 0.0341 (se: 0.014) for daily incidence of sexual assault.
Michel, Wang et al. 2016[41]	Baltimore, Maryland, USA	2008-2013	all season	daily	monitors	Violent crime and homicide	Negative binomial regression model	Incidence rate ratio (IRR) of 1.006 (95% CI: 1.0056, 1.0081) for total crime, 1.0128 (1.0096, 1.016) for violent crime, and 1.010

								(0.9973, 1.0228) for homicide.
Muzafar Shah 2017[42]	Malaysia	1973-2009	all season	annually	monitors	Violent crime and property crime	Estimated Generalized One-Step Error-Correction Model	There is a long-term association between crime and temperature.
O'Loughlin, Linke et al. 2014[43]	42 countries in sub-Saharan Africa	1980-2012	all season	monthly	modeled	Conflict	Poisson regression model	There were associations between extreme temperature and conflict.
O'Loughlin, Witmer et al. 2012[44]	Multiple countries in East Africa	1990-2009	all season	monthly	modeled	Conflict	Negative binomial regression model	Temperature above average has shown increase in conflict.
Otrachshenko, Popova et al. 2021[45]	79 regions, Russia	1989-2015	all season	annually	monitors	Violent mortality	Negative binomial regression model	Hot temperature increased violent mortality, whereas cold temperature had no effect.
Pacillo, Kangogo et al. 2022[46]	Mali, Africa	2014-2015 and 2017-2018	all season	3 months	monitors	Conflict	Structural equation modeling (SEM)	Effect estimates of 0.021 (se: 0.006) for total conflicts.
Peng, Xueming et al. 2011[47]	Beijing, China	2004-2005	all season	hourly	monitors	Robbery and burglary	Ordinary Least Squares regression model	The slope between temperature and robbery was 0.18 and 1.85 for burglary.
Peng and Zhan 2022[48]	129 prefecture-level cities, China	2013-2019	all season	annually	monitors	Criminal arrest	Fixed effects model with instrumental variables (IV-FE) and spatial	Extreme climate had a significant positive effect on crime arrest rate.

							Durbin model (SDM)	
Potgieter, Fabris-Rotelli et al. 2022[49]	Developing township of Khayelitsha, in the Western Cape Province of South Africa	2006-2016	all season	daily	monitors	Violent crime, property crime, and sexual crime	Negative binomial regression model	Relative risk (17◦C vs 75th percentile (20.2◦C) for all crime is 1.02 (95% CI: 0.99, 1.06), 1.07 (1.03, 1.12) for violent crime, and 0.93 (0.90, 0.96) for property crime, and 1.01 (0.94, 1.09) for sexual crime.
Rahman, Lorenzo et al. 2023[50]	California, USA	2014-2019	all season	daily	modeled	Homicide	Case-crossover study design	Odds ratio is 1.009 (95% CI: 1.002, 1.015) for homicide.
Ranson 2014[51]	2,997 counties in the 49 continental US states	1980-2009	all season	monthly	monitors	Assault, murder, robbery, motor vehicle theft, burglary, and rape	Poisson regression models	Effect estimates of 0.006 (se: 0) for aggravated assault and 0.005 (se: 0) for simple assault for temperature over 100◦F.
Reeping and Hemenway 2020[52]	Chicago, USA	2012-2016	all season	daily	monitors	Shooting	Negative binomial regression model	A 10-degree higher temperature than average has increased 33.8% higher rate of shootings.
Rotton and Cohn 2000[53]	Dallas, Texas, USA	1994-1995	all season	daily	monitors	Aggravated assault	Ordinary Least Squares regression model	Effect estimates of 0.00516 (se: 0.001214) for aggravated assault.
Rotton and Cohn 2000b[54]	Minneapolis, Minnesota, USA	1987-1988	all season	daily	monitors	Aggravated assault	Generalized least square analysis	There was an inverse U shape relationship between

								temperature and aggravated assault.
Ruderman and Cohn 2021[55]	Multiple cities in USA	2014-2019	all season	daily	monitors	Multiple-victim shooting	Poisson regression model	Temperature anomaly alters the MVS rate exponentially by a rate of 0.022±0.005°F−1 (95% CI 0.013, 0.032)
Sanz-Barbero, Linares et al. 2018[56]	Madrid, Spain	2008-2016	summer	daily	monitors	Intimate partner violence	Poisson regression model	Heat waves were associated with an increase in intimate partner violence.
Schinasi and Hamra 2017[57]	Philadelphia in Pennsylvania, USA	2006-2015	all season	daily	monitors	Violent crime and property crime	Quasi-Poisson generalized additive model	There was a linear and positive relationship between heat index and violent crimes.
Schutte and Breetzke 2018[58]	Tshwane, South Africa	2001-2006	all season	daily	monitors	Violent crime, property crime, and sexual crime	Analysis of variance (ANOVA)	There was a strong association with temperature and criminal activity.
Schutte, Breetzke et al. 2021[59]	2 township communities on the Cape Flats, South Africa	2007-2014	all season	daily	monitors	Murder, assault, robbery, and rape	Analysis of variance (ANOVA) and multiple regression model	Temperature increase was associated with assault.
Shen, Hu et al. 2020[60]	Beijing, China	2005-2016	all season	daily	monitors	Assault, motor vehicle theft, robbery, and rape	Linear regression model	There was a strong positive linear correlation between the seasonality of temperature and violent robbery, assault and rape.

Sommer, Lee et al. 2018[61]	Boston, Massachusetts, USA	2012-2017	all season	daily	monitors	Aggravated assault	Bayesian analysis	There were more crimes reported on temperate days compared to extremely cold days, and on dry days compared to rainy days.
Sorg and Taylor 2011[62]	Philadelphia in Pennsylvania, United States	2007-2009	all season	monthly	monitors	Robbery	Poisson regression model	Effect estimates of 0.002 (se: 0.0004) for robbery counts.
Stechemesser, Levermann et al. 2022[63]	USA	2014-2020	all season	daily	modeled	Angry tweets	Panel regression	Hot temperature is shown to aggravate the aggression online.
Stevens, Beggs et al. 2019[64]	153 local government areas (LGAs), New South Wales, Australia	2006-2016	all season	daily, monthly	modeled	Assault, theft, and fraud	Logistic regression	Estimated count of assault was 51 (95% CI: 44, 58), 23 (-6, 52) for theft, and -2 (-16, 12) for fraud.
Stevens, Graham et al. 2021[65]	New South Wales, Australia	2015-2017	all season	daily	monitors	Angry tweets and assaults	Multiple regression model with generalized additive models (GAMs)	Coefficient of 0.073 (se: 0.029) for assault and maximum temperature.
Stevens, Graham et al. 2023[66]	New South Wales, Australia	2006-2018	all season	daily	modeled	Domestic crime, non-domestic crime, and sexual crimes	Negative binomial regression	Effect estimates of 5.2 (se: 0.453) for domestic violence inside, 5.146 (se: 0.861) for sexual assault.

Takahashi 2017[67]	47 prefectures, Japan	2009-2015	all season	daily	monitors	Murder, assault, arson, rape, sexual assault, abduction, robbery, burglary, and motor vehicle theft	Generalized additive model (GAM)	1°C increase in daily mean temperature was associated with 2.6% increase in violent crimes, 1.5% increase in property crimes, and 1.9% increase in total crimes.
Talaei, Hedjazi et al. 2014[68]	Mashhad, Iran	2006-2010	all season	daily	monitors	Rage, homicide, and hospitalization	Poisson regression model	The study has not found significant correlation between homicide and any meteorological variables.
Tiihonen, Halonen et al. 2017[69]	Finland	1996-2013	all season	monthly	monitors	Violent crime	Poisson regression model	Increase per degree centigrade is 1.7% (95% CI: 1.1, 2.4) for violent crime rates.
Tol and Wagner 2010[70]	Multiple countries, Europe	1568-1648	all season	annually	modeled	Conflict	Linear regression model	Conflict was frequent in cold days.
Towers, Chen et al. 2018[71]	Chicago in Illinois USA	2001-2014	all season	daily	monitors	Assault, robbery, motor vehicle theft, theft, and burglary	Linear regression models	Percent change in average incidence of aggravated assault is 0.37 ± 0.09 for winter times only.
Trujillo and Howley 2021[72]	Barranquilla, Colombia	2010-2016	all season	daily	monitors	Homicide	Generalized linear model	Incidence rate ratio of 0.981 (se: 0.022) for homicides.
van de Vliert, Schwartz et al. 1999[73]	136 countries	1948-1977	all season	daily	modeled	Political violence	Hierarchical regression	Political riots were higher in warm countries compared to hot and cold countries.

van Weezel 2020[74]	Africa	2003-2017	all season	annually	modeled	Armed conflict	Bayesian Model Averaging (BMA)	Temperature was correlated to armed conflict risk.
Wei, Shao et al. 2022[75]	171 countries	2000-2018	all season	annually	modeled	Homicide	Ordinary linear squares model	Effect estimates of 0.130 (se: 0.061) for homicide.
Wesselbaum 2022[76]	New York, USA	2006-2020	all season	daily	monitors	Violent crime, homicide, and murder	Negative binomial regression model	Effect estimates of -0.0066 (se: 0.0035) for violent crime, 0 (se: 0.0002) for homicide, and 0 (se: 0.0002) for murder.
Williams, McDonogh-Wong et al. 2020[77]	23 cities, USA	2000-2019	all season	daily	monitors	Police fire calls	Generalized additive model	There was an increase in fire and police calls as daily maximum temperature increased.
Williams, Allen et al. 2020[78]	Boston, Massachusetts, USA	2010-2014	all season	daily	modeled	Dispatch calls	Poisson regression model	Increased heat index has increased the risk of police dispatch calls.
Williams, Hill et al. 2015[79]	5 police districts and 66 territorial districts in New Zealand	1993-2009	all season	daily	modeled	Assault resulting in hospitalization	Generalized linear mixed models	The correlation between mean temperature and the rate of assaults causing hospitalization by district was positive, r = 0.41 (95 % CI: 0.18, 0.59).
Wu, Lee et al. 2020[80]	Virginia, USA	1973-2009	all season	monthly	monitors	Violent crime, assault, murder, robbery, property crime,	Multiple regression model	Effect estimates of 1.146 (T value: 4.951) for violent crime and16.235 (T

						motor vehicle theft, burglary, and rape		value: 7.321) for property crime.
Xu, Xiong et al. 2020[81]	9 cities, USA	2007-2017	all season	daily	modeled	Homicide	Conditional logistic regression model	Odds ratio for every 5◦C increase in temperature for intentional homicide is 1.095 (95% CI: 1.043, 1.150) for Chicago.
Yiannakoulias and Kielasinska 2016[82]	Toronto, Canada	1996-2007	all season	daily	monitors	Arson	Poisson regression model	Effect estimates of 0.168 (se: 0.02) for arson.
Yu, Mu et al. 2017[83]	Taiwan	2006-2015	all season	daily	monitors	Violent crime and property crime	Negative binomial regression model	Effect estimates of 0.0019 (se: 0.0012) for all property and 0.0184 (se: 0.0033) for all violent crime.
Zhu, He et al. 2023[84]	India, Nepa, and Pakistan	2000-2018	all season	annually	modeled	Intimate Partner Violence (IPV)	Multivariable mixed-effects logistic regression	Percent change is 4.49 (95% CI: 4.2, 4.78) for IPV.

Table S4. Summary of the association of the included studies for systematic literature review of the association between temperature, crime and violence

Crime/Violence Type	Number of Studies[a]	Summary of association[b]				Temperature Metrics[c]
		Positive		Negative		
		p-value <0.05	p-value >=0.05	p-value <0.05	p-value >=0.05	
Total Crime[d]	8	9	5	0	0	5 mean, 3 max, 1 min, and 2 others
Violent Crime						
General[e]	22	10	1	1	0	9 mean, 7 max, 2 min, and 6 others
Assault	29	24	3	1	2	22 mean, 6 max, 1 min, and 2 others
Homicide	20	12	6	0	5	17 mean, 2 max, and 1 other
Robbery	20	9	1	2	1	14 mean, 4 max, and 2 other
Murder	5	6	1	0	0	4 mean and 2 max
Firearm violence	5	3	0	0	0	5 max
Property Crime						
General[e]	16	7	3	2	0	10 mean, 4 max, 2 min, and 4 others
Burglary	14	6	0	0	2	11 mean and 3 max
Motor Vehicle Theft	10	7	0	1	2	8 mean, 3 max, and 2 other
Theft	8	5	1	0	1	7 mean and 2 max
Larceny	5	3	1	0	1	3 mean and 2 max
Arson	3	1	0	0	1	3 mean
Sexual Crime[f]						
General[e]	3	2	1	0	1	3 mean, 1 max, and 1 other
Rape	8	6	1	0	0	9 mean and 2 max
Intimate Partner Violence (IPV)	3	3	1	0	0	1 mean, 2 max, and 1 other
Others[g]	39	19	5	1	2	15 mean, 15 max, 1 min, and 7 others

Note: [a] One study may appear in multiple rows for different types of crime/violence as some studies examined multiple crime/violence; [b] Summary of the association as Positive/Negative indicating the statistically significant results for the positive/negative association for temperature and crime/violence based on the p-value, study results without statistical significance were not counted, and studies with multiple results were counted more than once accordingly. Therefore, the row sum of the results does not add up to the total number of studies; [c] Some studies have examined mean temperature, maximum temperature, or others, including heat index or temperature shock; [d] Total crime focused on studies categorizing the outcome as total crime (aggregating different crime/violence as total crime); [e] "General" refers to a grouping of violence/property/sexual crime for which types of crime were categorized differently by study; [f] Sexual crime can be violent but is examined here as a separate category from other types of violent crime; [g] Others including civil war, angry tweets, political violence, assault mortality, urban crime, and breaks.

Table S5. The summary of association of the included studies for systematic literature review of the association between temperature, crime and violence by geographical locations

	Number of Studies[a]	Summary of association[b]			
		Positive		Negative	
		p-value <0.05	p-value >=0.05	p-value <0.05	p-value >=0.05
Total	83	132	30	8	18
Africa	10	14	4	0	2
Asia	15	40	6	0	3
Europe	7	4	1	0	0
North America	39	59	16	5	12
Oceania	7	11	0	1	0
South America	1	1	0	0	1
Other[c]	4	3	3	2	0

Note: [a] One study may appear in multiple rows for different types of crime/violence as some studies examined multiple crime/violence; [b] Summary of the association as Positive/Negative indicating the statistically significant results for the positive/negative association for temperature and crime/violence based on the p-value, study results without statistical significance were not counted, and studies with multiple results were counted more than once accordingly. Therefore, the row sum of the results does not add up to the total number of studies; [c]other study continents where there are multiple countries analyzed for the study

Table S6. Heat map for risk of bias rating and quality rating for the included studies for systematic literature review of the association between temperature, crime and violence

Study	Risk of Bias							
	Key Criteria			Other Criteria				
	Exposure assessment	Outcome assessment	Confounding bias	Selection bias	Attrition/ exclusion bias	Selective reporting bias	Conflict of interest	Other source of bias
Algahtany, Kumar et al. 2022[2]	3	2	3	2	2	1	1	2
Annan-Phan and Ba 2023[3]	2	2	3	1	2	2	3	3
Auliciems and DiBartolo 1995[4]	2	2	3	2	1	1	3	3
Baryshnikova, Davidson et al. 2022[5]	1	2	1	1	1	1	3	1
Berman, Bayham et al. 2020[6]	1	2	1	1	1	1	1	1
Bollfrass and Shaver 2015[7]	4	4	3	3	3	2	3	2
Butke and Sheridan 2010[8]	1	1	1	2	1	1	3	3
Castle and Kovacs[9]	2	2	1	2	1	1	3	2
Chambru 2020[10]	4	4	2	3	1	1	1	2
Churchill, Smyth, and Trinh 2023[11]	3	3	2	2	2	1	1	2
Cohn and Rotton 2000[12]	2	2	2	2	1	1	3	2
Corcoran and Zahnow 2021[13]	2	2	2	1	1	1	1	2
Cruz, D'Alessio et al, 2023[14]	1	2	3	1	1	1	1	3
DeFronzo 1984[15]	3	3	2	3	3	2	3	2
FIELD 1992[16]	3	3	3	2	2	2	3	2
Gamble and Hess 2012[17]	2	2	2	2	2	1	1	2

Gates, Klein et al. 2019[18]	1	2	1	2	1	1	2	1
Heilmann, Kahn et al. 2021[19]	2	2	1	2	2	1	3	1
Hodgkinson, Corcoran et al. 2023[20]	2	2	2	2	2	1	1	2
Hou, Zhang et al. 2023[21]	1	1	1	1	1	2	2	1
Hu, Wu et al. 2017[22]	3	3	4	2	2	2	2	2
Jung, Kim et al. 2020[23]	3	3	1	1	2	2	1	2
Jung, Chun et al. 2020[24]	3	3	1	2	2	2	3	2
Kim, Kim et al 2023[25]	2	2	1	1	2	2	2	2
Le, Berman et al. 2022[26]	2	1	1	2	2	2	2	1
Lemon and Partridge 2017[27]	2	3	2	1	2	2	1	2
Li, Feng et al. 2023[28]	4	4	2	1	2	2	2	2
Linning, Andresen et al. 2017[29]	3	2	2	1	2	1	2	2
Linning, Andresen et al. 2017b[30]	3	3	2	2	2	2	3	2
Lynch, Stretesky et al. 2020[31]	3	3	3	1	2	2	1	3
Lynch, Stretesky et al. 2022[32]	3	3	4	2	3	2	1	4
Lyons, Gause et al. 2022[33]	2	1	1	2	2	2	3	1
Mapou, Shendell et al. 2017[34]	2	2	2	2	1	2	3	2
Mares 2013[35]	3	3	2	2	2	2	3	2
Mares 2013b[36]	3	3	2	2	2	2	3	2
Mares and Moffett 2016[37]	2	2	3	2	2	1	1	1
Mares and Moffett 2019[38]	2	2	3	2	1	2	3	2
Maystadt, Calderone et al. 2014[39]	2	2	2	1	2	2	2	1
McLean 2007[40]	2	2	3	2	2	2	3	3

Michel, Wang et al. 2016[41]	2	2	2	2	2	2	1	2
Muzafar Shah 2017[42]	3	3	3	2	2	2	2	3
O'Loughlin, Linke et al. 2014[43]	2	3	3	1	1	2	2	2
O'Loughlin, Witmer et al. 2012[44]	3	3	2	1	1	2	2	1
Otrachshenko, Popova et al. 2021[45]	2	3	2	2	2	2	3	1
Pacillo, Kangogo et al. 2022[46]	3	3	4	2	2	2	2	3
Peng, Xueming et al. 2011[47]	2	1	2	1	1	3	1	2
Peng and Zhan 2022[48]	2	4	3	2	1	2	2	1
Potgieter, Fabris-Rotelli et al. 2022[49]	2	2	2	2	2	2	1	1
Rahman, Lorenzo et al. 2023[50]	1	1	2	2	2	1	2	1
Ranson 2014[51]	1	2	2	1	1	1	3	1
Reeping and Hemenway 2020[52]	3	3	3	2	2	1	1	2
Rotton and Cohn 2000[53]	2	2	1	1	1	1	3	2
Rotton and Cohn 2000b[54]	2	2	1	1	1	1	3	2
Ruderman and Cohn 2021[55]	2	2	1	1	2	1	1	2
Sanz-Barbero, Linares et al. 2018[56]	2	2	2	3	2	1	1	2
Schinasi and Hamra 2017[57]	2	2	1	2	2	2	2	1
Schutte and Breetzke 2018[58]	2	2	3	3	2	1	1	3
Schutte, Breetzke et al. 2021[59]	2	2	3	2	2	2	3	2
Shen, Hu et al. 2020[60]	3	2	3	1	2	2	2	3
Sommer, Lee et al. 2018[61]	2	2	2	2	2	3	2	2
Sorg and Taylor 2011[62]	3	3	2	2	2	1	3	2

Stechemesser, Levermann et al. 2022[63]	2	2	2	3	2	1	2	2
Stevens, Beggs et al. 2019[64]	2	2	2	1	2	1	3	2
Stevens, Graham et al. 2021[65]	2	2	2	3	2	3	1	2
Stevens, Graham et al. 2023[66]	2	2	3	2	2	2	1	2
Takahashi 2017[67]	2	3	2	1	2	2	1	2
Talaei, Hedjazi et al. 2014[68]	2	2	3	2	2	2	3	3
Tiihonen, Halonen et al. 2017[69]	3	2	3	1	2	1	1	2
Tol and Wagner 2010[70]	3	3	2	1	2	1	3	2
Towers, Chen et al. 2018[71]	2	2	2	2	2	2	3	2
Trujillo and Howley 2021[72]	2	2	2	1	1	1	2	1
van de Vliert, Schwartz et al. 1999[73]	3	3	3	3	2	2	2	3
van Weezel 2020[74]	2	3	3	2	2	2	1	2
Wei, Shao et al. 2022[75]	3	3	2	2	2	1	2	1
Wesselbaum 2022[76]	2	2	2	1	2	2	1	2
Williams, McDonogh-Wong et al. 2020[77]	2	2	2	2	2	2	1	2
Williams, Allen et al. 2020[78]	2	2	2	2	3	2	1	2
Williams, Hill et al. 2015[79]	1	1	2	1	2	2	3	1
Wu, Lee et al. 2020[80]	2	2	4	1	2	2	1	3
Xu, Xiong et al. 2020[81]	1	1	1	2	2	2	1	1
Yiannakoulias and Kielasinska 2016[82]	2	2	2	2	2	1	1	2
Yu, Mu et al. 2017[83]	2	2	2	2	2	2	3	1
Zhu, He et al. 2023[84]	2	3	2	3	2	1	2	1

Note: Green indicating low risk of bias (score 1), olive green indicating probably low risk of bias (score 2); yellow indicating probably high risk of bias (score 3); red indicating high risk of bias (score 4)

Table S7. Details of risk of bias assessment for included studies for systematic literature review of the association between temperature, crime and violence.

Study	Risk of Bias ratings, reason							
	Key Criteria			Other Criteria				
	Exposure assessment	Outcome assessment	Confounding bias	Selection bias	Attrition/ exclusion bias	Selective reporting bias	Conflict of interest	Other source of bias
Algahtany, Kumar et al. 2022[2]	Probably high The study used monthly temperature data for measuring exposure, which might attenuate the true temperature effect. Also, no quality control of the temperature data is reported.	Probably low Outcome data are based on Ministry of Justice, which it is routine and long-term and, thus, likely to be more reliable than other data collection systems. However, it is based on monthly average counts.	Probably high The study did not control for all primary confounders (time trend and seasonality). However, they considered different factors (humidity and haze).	Probably low They have included two different cities; this might suggest the indirect evidence of low risk of bias.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low Focused on assault, alcohol, drug, theft, homicide, and sexual assault. All the relevant findings were reported.	Low Declared no competing financial interests.	Probably low Multiple regression was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Annan-Phan and Ba 2023[3]	Probably low The study used daily temperature data from European Centre for Medium-Range Weather Forecasts. Also, the exposure dataset was population weighted.	Probably low Outcome data are based on FBI's Uniform Crime Reporting Data System (UCR), which it is routine and long-term and, thus, likely to be more reliable than other data collection systems. However, the outcome was based	Probably high The study did not control for all primary confounders (time trend and seasonality). However, they considered different factors (fixed effects and space).	Low All of the reported crimes from USA were included in the study.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low Focused on civilian deaths and threats.	Probably high No declaration of potential conflict of interest found.	Probably high Poisson regression model was used. Sensitivity analysis like linearity check was not conducted.

		on monthly value estimates.						
Auliciems and DiBartolo 1995[4]	Probably low Daily maximum temperature data were obtained from the Bureau of Meteorology (BOM).	Probably low Outcome data are based on daily number of police calls; however, the study does not provide quality assurance of the outcome data.	Probably high The main analysis of the study was correlation analysis, and the humidity and rain were adjusted for the multiple regression.	Probably low Included all the police calls, but not all the incidents might have been captured.	Low No outcome data was excluded inappropriately.	Low Focused on the number of calls, which was all reported.	Probably high No declaration of potential conflict of interest found	Probably high Multiple regression model using weekly calls might not be adequate. Also, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Baryshnikova, Davidson et al. 2022[5]	Low Hourly mean temperature data were obtained from the National Oceanic and Atmospheric Administration's National Centers for Environmental Information land-based stations. Also, explored the data have been explored for missing values.	Probably low Outcome data are based on police department, which it is routine and long-term and, thus, likely to be more reliable than other data collection systems. However, the study does not provide quality assurance of the outcome data.	Low The study controlled for all primary confounders (time trend and seasonality) and considered different confounders (Wind direction, holidays, hour and day of full moon, and marathons).	Low The hourly crime/violence counts that are presented on Figure 1 show a reasonable distribution.	Low No outcome data was excluded inappropriately.	Low Focused on the violent and property crime, which was all reported.	Probably high No declaration of potential conflict of interest found.	Low A linear regression model was conducted. Different sensitivity analyses of the model were performed, which provide direct evidence that the used method was appropriate.

Berman, Bayham et al. 2020[6]	Low Daily mean temperature data were obtained from the gridMET spatiotemproal reanalysis weather data model. Also, explored the correlation with the monitoring station dataset.	Probably low Outcome data are based on Federal Bureau of Investigation (FBI) National Incidence Based Reporting System (NIBRS), which it is routine and long-term and, thus, likely to be more reliable than other data collection systems. However, the study does not provide quality assurance of the outcome data.	Low The study controlled for all primary confounders (time trend and seasonality) and considered different confounders (Day of week, holiday, and long-term temporal trends (population shifts, seasonal trends)).	Low The daily crime/violence counts that are presented on Figure 1 show a reasonable distribution.	Low No outcome data was excluded inappropriately.	Low Focused on the violent and property crime, which was all reported.	Low Declared no competing financial interests.	Low A two-stage hierarchical model was conducted. Different sensitivity analyses of the model were performed, which provide direct evidence that the used method was appropriate.
Bollfrass and Shaver 2015[7]	High The study used georeferenced temperature data for measuring exposure. Also, no quality control or the resource of the temperature data is reported.	High The study used georeferenced conflict data. Also, no quality control or the resource of the outcome data is reported.	Probably high The study did not control for all primary confounders but controlled for other confounders.	Probably high Included the civil wars for sub-Saharan Africa and the study omitted some conflict years.	Probably high The civil war incidence dataset is not under quality control, which could result in high percentage of missing dataset.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably high No declaration of potential conflict of interest found	Probably low Various regression model was used. However, no sensitivity analysis was done.
Butke and Sheridan 2010[8]	Low 3-hour mean temperature data were obtained from the National	Low Outcome data are based on Case Western Reserve University's Center	Low The study controlled for all primary confounders	Probably low Included all the crime from Cleveland.	Low The coverage for crime and temperature	Low Focused on the various crimes,	Probably high No declaration	Probably high Spatial regression model was used.

	Climatic Data Center (NCDC) for Cleveland Hopkins International Airport. Also, explored the data have been explored for missing values.	on Urban Poverty and Social Change. The study does provide quality assurance of the outcome data.	(time trend and seasonality) and considered different confounders.		dataset was over 99%, showing a high completeness.	which was all reported.	of potential conflict of interest found.	Regression analysis and sensitivity analysis like linearity check was not conducted.
Castle and Kovacs[9]	Probably low Daily temperature data were obtained from the monitoring stations. However, the study does not provide quality assurance of the exposure data.	Probably low Outcome data are based on police service in North Bay. However, the study does not provide quality assurance of the outcome data.	Low The study controlled for all primary confounders (time trend and seasonality) and considered different confounders.	Probably low Included all the crime from North Bay, which is a small city.	Low No outcome data was excluded inappropriately.	Low Focused on the all the police calls, which was all reported.	Probably high No declaration of potential conflict of interest found.	Probably low Negative binomial regression model was used. Sensitivity analysis like linearity check was not conducted.
Chambru 2020[10]	High The study used seasonal average temperature at the province level, which might attenuate the true temperature effect. Also, no quality control of the	High Outcome data are based on the annual ratio of offenders in all criminal procedures per 100,000 inhabitants from the Savoyard judicial archives. Also, no quality control of the	Probably low The study controlled for some primary confounders (time trend) and considered different confounders.	Probably high The people resided in Savoy, which does not exist currently, is included.	Low No outcome data was excluded inappropriately.	Low Focused on the total, violent, and property crime, which was all reported.	Low Declared no competing financial interests.	Probably low Multiple regression model was used. Sensitivity analysis like linearity check was not conducted.

	temperature data is reported.	outcome data is reported.						
Churchill, Smyth, and Trinh 2023[11]	Probably high The study used temperature data from European Centre for Medium-Range Weather Forecasts (ECMWF), using a monthly value which might attenuate the true temperature effect. Also, no quality control of the temperature data is reported.	Probably high Outcome data are based on the monthly rates from the government agency. However, no quality control of the outcome data is reported.	Probably low The study controlled for some primary confounders (time trend) and considered different confounders.	Probably low Included all the crime from Victoria, New South Wales, Queensland.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low Focused on the total, violent, and property crime, which was all reported.	Low Declared no competing financial interests.	Probably low Multiple regression model was used. Sensitivity analysis like linearity check was not conducted.
Cohn and Rotton 2000[12]	Probably low 3-hour interval temperature data were obtained from the National Weather Service (NWS). However, the study does not provide quality assurance of the exposure data.	Probably low Outcome data are based on Police Department of Minneapolis, MN. However, the study does not provide quality assurance of the outcome data.	Probably low The study controlled for some primary confounders (time trend) and considered different confounders.	Probably low Included all the police calls from Minneapolis.	Low The coverage for crime and temperature dataset was over 97%, showing a high completeness.	Low Focused on burglary, robbery, and theft, which was all reported.	Probably high No declaration of potential conflict of interest found.	Probably low Hierarchical regression analyses were used. Sensitivity analysis like linearity check was not conducted.
Corcoran and Zahnow 2021[13]	Probably low	Probably low	Probably low	Low	Low	Low	Low	Probably low

	Daily temperature data were obtained from the Australian Bureau of Meteorology. However, the study does not provide quality assurance of the exposure data.	Outcome data are based on daily Queensland Police Service crime data. However, the study does not provide quality assurance of the outcome data.	The study controlled for some primary confounders (season) and considered different confounders.	The daily assault and temperature that are presented on Figure 2 show a reasonable distribution.	No outcome data was excluded inappropriately.	Focused on assault which was all reported.	Declared no competing financial interests.	Negative binomial multilevel regression model was used. Sensitivity analysis like linearity check was not conducted.
Cruz, D'Alessio et al, 2023[14]	Low Daily maximum temperature data were obtained from the Weather Underground, a commercial weather company that provides real-time and archived weather statistics across the United States. Also, the study does provide quality assurance of the exposure data.	Probably low Outcome data are based on Federal Bureau of Investigation (FBI) National Incidence Based Reporting System (NIBRS), which it is routine and long-term and, thus, likely to be more reliable than other data collection systems. However, the study does not provide quality assurance of the outcome data.	Probably high The study did not control for all primary confounders (time trend and seasonality).	Low The daily crime/violence counts that are presented on Figure 1 show a reasonable distribution, hence providing evidence that inclusion of crime/violence in each time period is not based on any factor associated with the exposure.	Low No outcome data was excluded inappropriately.	Low Focused on violent crime which was all reported.	Low Declared no competing financial interests.	Probably high The use of autoregressive integrative moving average (ARIMA) analysis is not appropriate for count data.
DeFronzo 1984[15]	Probably high The study used annual temperature	Probably high Outcome data are based on the annual	Probably low The study did control for some	Probably high Only included the Standard	Probably high Excluded the 62 SMSAs	Probably low All the outcomes that	Probably high No	Probably low Regression model was

	data from U.S. Department of Commerce (1979), which might attenuate the true temperature effect. Also, no quality control of the temperature data is reported.	Uniform Crime Reports, which it is routine and long-term. However, no quality control of the outcome data is reported.	primary confounders and other confounders.	Metropolitan Statistical Areas (SMSAs) with high population.	with population less than 200,000. Total 142 SMSAs from 204 SMSAs.	the study pre-specified in the abstract and methods sections are explicitly reported.	declaration of potential conflict of interest found.	conducted. However, there is no sensitivity analysis.
FIELD 1992[16]	Probably high The study used annual temperature data from Annual Abstract of Statistics (London: HMSO), which might attenuate the true temperature effect. Also, no quality control of the temperature data is reported.	Probably high Outcome data are based on the annual Home Office Statistical Department. Also, no quality control of the outcome data is reported.	Probably high The study did not control for all primary confounders but controlled for other confounders.	Probably low Included all the number of crimes.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably high No declaration of potential conflict of interest found.	Probably low Regression model was conducted. However, there is no sensitivity analysis.
Gamble and Hess 2012[17]	Probably low Daily temperature data were obtained from the National Climatic Data Center. However, the study does not provide quality assurance of the exposure data.	Probably low Outcome data are based on Dallas Police Department, which it is routine and long-term and, thus, likely to be more reliable than other data collection systems. However, the study	Probably low The study did control for some primary confounders and other confounders.	Probably low Included all the number of crimes.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low Focused on aggravated assault, homicide, and rape, which was all reported.	Low Declared no competing financial interests.	Probably low Regression model was conducted. However, there is no sensitivity analysis.

		does not provide quality assurance of the outcome data.						
Gates, Klein et al. 2019[18]	Low Daily mean temperature data were obtained from the National Oceanographic and Atmospheric Association of the United States and South Africa's Agricultural Research Council. Also, explored the data have been explored for missing values.	Probably low Outcome data are based on Statistics South Africa, which it is routine and long-term and, thus, likely to be more reliable than other data collection systems. However, the study does not provide quality assurance of the outcome data.	Low The study controlled for all primary confounders (time trend and seasonality) and considered different confounders (Day of the week, month, district, long-term trends, and unmeasured individual-level factors (e.g., age)).	Probably low There is no direct evidence that inclusion of crime/violence in each time is not based on any factor associated with exposure. Since the data comes from Statistics South Africa, we assume the risk of bias is probably low.	Low The coverage for crime and temperature dataset was high since the missing data were reconstructed.	Low Focused on homicide, which was all reported.	Probably low Have funding source, but declared no competing financial interests.	Low A time stratified case-crossover was conducted. Different sensitivity analyses of the model were performed, which provide direct evidence that the used method was appropriate.
Heilmann, Kahn et al. 2021[19]	Probably low Daily maximum temperature data were obtained from the National Climatic Data Center (NCDC) administered by the National Oceanic and Atmospheric Administration (NOAA).	Probably low Outcome data are based on city portal, which it is routine and long-term and, thus, likely to be more reliable than other data collection systems. However, the study does not provide quality	Low The study controlled for all primary confounders (time trend and seasonality) and considered different confounders (day of year, day of week, school vacation	Probably low Included all the number of crimes.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low Focused on crime rates, which was all reported.	Probably high No declaration of potential conflict of interest found.	Low Poisson fixed effects regression was conducted. Different sensitivity analyses of the model were performed, which provide direct evidence that the used

	However, there is no mention of missing values.	assurance of the outcome data.	schedule, summer vacation, poverty level of neighborhood, and housing age).					method was appropriate.
Hodgkinson, Corcoran et al. 2023[20]	Probably low Daily temperature data were obtained from the Australian government's Bureau of Meteorology. However, there is no mention of missing values.	Probably low Outcome data are based on Queensland Police Service though the Griffith Criminology Institute's Social Analytics Laboratory at Griffith University. However, the study does not provide quality assurance of the outcome data.	Probably low The study did control for some primary confounders and other confounders.	Probably low Included all the number of crimes.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low Focused on violent crimes, which was all reported.	Low Declared no competing financial interests	Probably low Regression model was conducted. However, there is no sensitivity analysis.
Hou, Zhang et al. 2023[21]	Low Daily mean temperature data were obtained from the US National Oceanic and Atmospheric Administration (NOAA). Also, explored the data have been	Low Outcome data are based on The Chicago urban crime dataset. Also, explored the data have been explored for missing values.	Low The study controlled for all primary confounders (time trend and seasonality) and considered different confounders.	Low All the cases were included.	Low The coverage for crime and temperature dataset was high since the missing data were reconstructed.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably low Declared no known competing financial interests.	Low Distributed lag nonlinear model was conducted. Different sensitivity analyses of the model were performed, which provide direct evidence

	explored for missing values.							that the used method was appropriate.
Hu, Wu et al. 2017[22]	Probably high The study used heat stress indices. Also, no quality control of the temperature data is reported.	Probably high Outcome data are based on the monthly Municipal Public Safety Bureau of Tangshan. However, no quality control of the outcome data is reported.	High The study did not control for primary confounders.	Probably low Included all the number of crimes and Figure 1 has shown the temporal trend.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably low Declared no known competing financial interests	Probably low Regression model was conducted. However, there is no study protocol.
Jung, Kim et al. 2020[23]	Probably high Weekly average temperature data were obtained from the Korean Meteorological Administration. There is no mention of missing values.	Probably high Outcome data are based on Korean National Police Agency, which it is routine and long-term and, thus, likely to be more reliable than other data collection systems. However, the study does not provide quality assurance of the outcome data and the outcome was based on weekly value estimates.	Low The study controlled for all primary confounders (time trend and seasonality) and considered different confounders (Population density, unemployment rate, proportion of elderly people, proportion of single-person households, proportion of	Low The daily crime/violence counts that are presented on Figure 1 show a reasonable distribution, hence providing evidence that inclusion of crime/violence in each time period is not based on any factor associated with the exposure.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Low Declared no competing financial interests.	Probably low Generalized linear mixed models (GLMMs) was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported. Hence, there is only indirect evidence that the method is appropriate.

			rental housing units, number of police officers per capita, number of CCTVs per capita, weekly precipitation and relative humidity).					
Jung, Chun et al. 2020[24]	Probably high Monthly mean temperature data were obtained from the Korean Meteorological Administration. There is no mention of missing values, and the values were aggregated in a monthly value.	Probably high Outcome data are based on Korean National Police Agency, which it is routine and long-term and, thus, likely to be more reliable than other data collection systems. However, the study does not provide quality assurance of the outcome data and the outcome was based on monthly value estimates.	Low The study controlled for all primary confounders (time trend and seasonality) and considered different confounders (monthly precipitation, BLSP household, 5 foreigner, divorce rate, migration rate, business density, and alcohol density).	Probably low There is no direct evidence that inclusion of crime/violence in each time period is not based on any factor associated with exposure. Since the data comes from Korean National Police Agency, we assume the risk of bias is probably low.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably high No declaration of potential conflict of interest found.	Probably low Poisson model was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported. Hence, there is only indirect evidence that the method is appropriate.
Kim, Kim et al 2023[25]	Probably low Daily maximum temperature data were obtained	Probably low Outcome data are based on Statistics Korea. However,	Low The study controlled for all primary	Low The distribution in Figure 1 for daily temperature	Probably low No sufficient information to	Probably low All the outcomes that the study pre-	Probably low	Probably low A time stratified case-crossover was

	from the Korean Meteorological Administration (KMA). However, there is no mention of missing values.	the study does not provide quality assurance of the outcome data.	confounders (time trend and seasonality) and considered different confounders.	and gun-related crimes are evenly distributed.	evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	specified in the abstract and methods sections are explicitly reported.	Declared no known competing financial interests.	conducted. However, there is no sensitivity analysis.
Le, Berman et al. 2022[26]	Probably low Daily mean temperature data were obtained from the weather station from The National Centre for Hydro-Meteorological Forecasting (NCHMF) of Vietnam. However, there is no mention of missing values.	Low Outcome data are based on daily number of crime events reported by Hanoi Police Department (HPD), which it is routine and long-term and, thus, likely to be more reliable than other data collection systems. Also, they have validated the dataset.	Low The study controlled for all primary confounders (time trend and seasonality) and considered different confounders (Day of week, public holidays, humidity, rainfall, and air pollution (PM_{10})).	Probably low There is no direct evidence that inclusion of crime/violence in each time period is not based on any factor associated with exposure. Since the data comes from PC02 Department, Police Headquarters Hanoi, we assume the risk of bias is probably low.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably low Declared no known competing financial interests.	Low Quasi-Poisson regression with distributed lag non-linear models (DLNMs) was conducted Different sensitivity analyses of the model were performed, which provide direct evidence that the used method was appropriate.
Lemon and Partridge 2017[27]	Probably low Daily maximum temperature from 9 weather stations (UK meteorological office integrated	Probably high Outcome data are based on daily counts from the local violence surveillances scheme run in three	Probably low The study controlled for some of the primary confounders (time trend) and	Low The daily crime/violence counts that are presented on Figure 2 show a reasonable	Probably low No sufficient information to evaluate the completeness of the outcome data, but the	Probably low All the outcomes that the study pre-specified in the abstract and methods	Low Declared no competing financial interests.	Probably low Negative binomial regression was conducted. However, no tests or

	data archive system (MIDAS)). However, there is no mention of missing values.	hospitals through paper-based questionnaires, which might have biases (e.g., recall bias).	considered different confounders (alcohol factor, and fixed effect of hospitals).	distribution, hence providing evidence that inclusion of crime/violence in each time period is not based on any factor associated with the exposure.	large sample size suggests potential low risk.	sections are explicitly reported.		sensitivity analysis for checking the appropriateness of the model is reported.
Li, Feng et al. 2023[28]	High The study used annual temperature data, which might attenuate the true temperature effect. Also, no quality control of the temperature data is reported.	High Outcome data are based on the annual violence from World Health Organization (WHO). Also, no quality control of the outcome data is reported	Probably low The study controlled for some of the primary confounders (time trend) and considered different confounders.	Low This study included multiple locations from different countries.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably low Declared no known competing financial interests.	Probably low Multivariate linear regression model was conducted. However, there is no sensitivity analysis.
Linning, Andresen et al. 2017[29]	Probably high Monthly temperature from Environment Canada historical climate data webpage was used. Also, there is no mention of missing values.	Probably low Outcome data are based on daily Ottawa Police Service website. However, the study does not provide quality assurance of the outcome data.	Probably low The study controlled for some of the primary confounders (season) and considered different confounders.	Low The monthly crime/violence counts that are presented on Figure 1 show a reasonable distribution, hence providing evidence that inclusion of crime/violence in	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low Focused on property crime, which was all reported.	Probably low Declared no known competing financial interests.	Probably low Multivariate linear regression model was conducted. However, there is no sensitivity analysis.

				each time period is not based on any factor associated with the exposure.				
Linning, Andresen et al. 2017b[30]	Probably high Temperature from Environment Canada historical climate data webpage was used. Also, there is no mention of missing values.	Probably high Outcome data are based on the Crime Analysis System, Pacific Region (CASPR), which is collected from eight cities in British Columbia. It is in monthly counts.	Probably low The study controlled for some of the primary confounders (time trend) and considered different confounders.	Probably low Included outcomes multiple cities from Canada.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably high No declaration of potential conflict of interest found.	Probably low Poisson regression model was conducted. However, there is no sensitivity analysis.
Lynch, Stretesky et al. 2020[31]	Probably high The study used annual temperature data for measuring exposure, which might attenuate the true temperature effect or capture seasonal effects rather than true temperature effects. Also, no quality control of the temperature data is reported.	Probably high Annual death records from the New York Federal Bureau of Investigation's Uniform Crime Reports online database system. London U.K. Home Office are used. Given the probably low reliability of vital registry and municipal data from countries in the region, there is a possibility that	Probably high The study did not adjust for any of the primary confounders.	Low The daily crime/violence counts that are presented on Figure 2 show a reasonable distribution, hence providing evidence that inclusion of crime/violence in each time period is not based on any factor associated with the exposure.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Low Declared no competing financial interests.	Probably high The study makes inferences about the association between temperature and mortality based on ordinary least squares regression model (OLS). Also, no tests or sensitivity analysis for checking the

		not all deaths in the study period have been captured, which can affect the final study results. Also, the study does not provide quality assurance of the outcome data.						appropriateness of the model is reported.
Lynch, Stretesky et al. 2022[32]	Probably high Annual temperature from National Oceanic and Atmospheric Administration (NOAA) was used. Also, there is no mention of missing values.	Probably high Annual outcome records, which can affect the final study results. Also, the study does not provide quality assurance of the outcome data.	High The study focused on the correlation.	Probably low Included outcome from various cities.	Probably high There were some missing datasets and were not solved.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Low Declared no competing financial interests.	High Correlation analysis is done. More main regression analysis and sensitivity analysis is needed.
Lyons, Gause et al. 2022[33]	Probably low Daily maximum temperature from North American Land Data Assimilation System Phase 2. However, there is no mention of missing values.	Low Outcome records were captured using Gun Violence Archive (GVA) data. The study did provide quality assurance of the outcome data.	Low The study controlled for all primary confounders (time trend and seasonality) and considered different confounders.	Probably low Included outcome from various cities from USA.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably High Declared competing financial interests.	Low Quasi-Poisson regression with distributed lag non-linear models (DLNMs) was conducted. Different sensitivity analyses of the model were performed, which provide

								direct evidence that the used method was appropriate.
Mapou, Shendell et al. 2017[34]	Probably low Daily mean temperature from database from the Weather Channel. However, there is no mention of missing values.	Probably low Outcome data are based on open access crime data sources for each city, which it is routine and long-term and, thus, likely to be more reliable than other data collection systems. However, the study does not provide quality assurance of the outcome data.	Probably low The study controlled for all the primary confounders (time trend and seasonality).	Probably low There is no direct evidence that inclusion of crime/violence in each time period is not based on any factor associated with exposure. Since the data comes from City of Chicago Data Portal, Houston Police Department Crime Statistics, Open Data Philly, and Data.Seattle.gov, for each different cities we assume the risk of bias is probably low.	Low No outcome data was excluded inappropriately.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably high No declaration of potential conflict of interest found.	Probably low Poisson regression was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Mares 2013[35]	Probably high The study used monthly temperature data for measuring exposure, which	Probably high Outcome data are based on Saint Louis Metropolitan Police Department's	Probably low The study controlled for some primary confounders (seasonality)	Probably low Included outcome from various subgroups near St. Louis.	Probably low No sufficient information to evaluate the completeness of the outcome	Probably low All the outcomes that the study pre-specified in the abstract	Probably high No declaration of potential	Probably low Regression analysis was conducted. However, no tests or

	might attenuate the true temperature effect. Also, no quality control of the temperature data is reported.	Uniform Crime Report, which it is routine and long-term and, thus, likely to be more reliable than other data collection systems. However, it is based on monthly average counts.	and other confounders.		data, but the large sample size suggests potential low risk.	and methods sections are explicitly reported.	conflict of interest found.	sensitivity analysis for checking the appropriateness of the model is reported
Mares 2013b[36]	Probably high The study used monthly temperature data for measuring exposure, which might attenuate the true temperature effect. Also, no quality control of the temperature data is reported.	Probably high Outcome data are based on Saint Louis Metropolitan Police Department's Uniform Crime Report, which it is routine and long-term and, thus, likely to be more reliable than other data collection systems. However, it is based on monthly average counts.	Probably low The study controlled for some primary confounders (seasonality) and other confounders	Probably low Included outcome from St. Louis.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably high No declaration of potential conflict of interest found.	Probably low Regression analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Mares and Moffett 2016[37]	Probably low The study used annual temperature data for measuring exposure, which might attenuate the	Probably low Outcome data are based on United Nations. Also, the details were provided.	Probably high The study did not control for primary confounders but	Probably low Included different countries with available dataset (57 countries).	Probably low No sufficient information to evaluate the completeness of the outcome	Low Focused on homicide, which was all reported.	Probably low Declared no known competing	Low Various analysis and sensitivity analysis was conducted.

	true temperature effect. However, the quality control and validation of the exposure dataset.		adjust for other confounders.		data, but the large sample size suggests potential low risk.		financial interests.	
Mares and Moffett 2019[38]	Probably low The study used monthly temperature data for measuring exposure, which might attenuate the true temperature effect. However, the quality control and validation of the exposure dataset.	Probably low Outcome data are based on Uniform Crime Reporting (UCR). Also, the details were provided.	Probably high The study did not control for primary confounders but adjust for other confounders.	Probably low Included the continental US.	Low The study indicates that average 94.8% of the state's report the outcome data for each month.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably high No declaration of potential conflict of interest found.	Probably low Negative binomial regression was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported
Maystadt, Calderone et al. 2014[39]	Probably low The study used monthly temperature data for measuring exposure, which might attenuate the true temperature effect. However, the quality control and validation of the exposure dataset.	Probably low Outcome data are based on Armed Conflict Location and Event Dataset (ACLED). Also, the details were provided.	Probably low The study controlled for some primary confounders (time trend) and other confounders	Low Figure 2 representing the mean temperature and violent conflicts were evenly distributed.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably low Declared no known competing financial interests.	Low Various analysis and sensitivity analysis was conducted.
McLean 2007[40]	Probably low	Probably low	Probably high	Probably low	Probably low	Probably low	Probably high	Probably high

	The study used daily temperature data for measuring exposure from Manchester Airport. However, the quality control and validation of the exposure dataset.	Outcome data are based on St. Mary's Sexual Assault Referral Centre in Manchester. However, the study does not provide quality assurance of the outcome data.	The study did not control for primary confounders.	Included outcomes from Manchester.	No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	No declaration of potential conflict of interest found.	The correlation analysis was mainly done, and the regression analysis adjusted few variables. No sensitivity analysis
Michel, Wang et al. 2016[41]	Probably low The study used daily temperature data for measuring exposure from the Global Historical Climate Network via the website of the National Climatic Data Center. However, the quality control and validation of the exposure dataset.	Probably low Outcome data are based on daily Victim Based Crime Data on the Baltimore Police Department Website. However, the study does not provide quality assurance of the outcome data.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Probably low Included outcomes from Baltimore.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Low Declared no competing financial interests.	Probably low Negative binomial regression was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Muzafar Shah 2017[42]	Probably high The study used monthly temperature data for measuring exposure, which might attenuate the true temperature effect. Also, no	Probably high Outcome data are based on Malaysia's Statistical Yearbook published by the Department of Statistics Malaysia. Also, no quality	Probably high The study did not control for primary confounders.	Probably low Included outcomes from Malaysia.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are	Probably low Declared no known competing financial interests.	Probably high No sensitivity analysis was done.

	quality control of the temperature data is reported.	control of the outcome data is reported.			potential low risk.	explicitly reported.		
O'Loughlin, Linke et al. 2014[43]	Probably low The study used monthly gridded temperature data for measuring exposure, which might attenuate the true temperature effect. However, the quality control of the temperature data is reported.	Probably high Outcome data are based on Armed Conflict Location and Event Dataset (ACLED), which is based on media reports. However, no quality control of the outcome data is reported.	Probably high The study did not control for primary confounders.	Low Figure 1 representing the mean temperature and violent conflicts were evenly distributed.	Low Focused on violent events, which was all reported.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably low Declared no known competing financial interests.	Probably low Poisson within-between multilevel model-random effects (MLM-RE) and some sensitivity analysis was done.
O'Loughlin, Witmer et al. 2012[44]	Probably high The study used monthly gridded temperature data for measuring exposure, which might attenuate the true temperature effect. Also, no quality control of the temperature data is reported.	Probably high Outcome data are based on Armed Conflict Location and Event Dataset (ACLED), which is based on media reports. However, no quality control of the outcome data is reported.	Probably low The study controlled for some primary confounders (time trend) and other confounders	Low Figure S1 representing the violent conflicts were evenly distributed.	Low Focused on violent events, which was all reported.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably low Declared no known competing financial interests.	Low Generalized linear model and generalized additive model was used and sensitivity analysis checking the robustness of the model is reported.
Otrachshenko, Popova et al. 2021[45]	Probably low The study used daily temperature data for measuring exposure from	Probably high Outcome data are based on Russian Federal State Statistics Service	Probably low The study controlled for some primary confounders	Probably low Included outcomes from Russia.	Probably low No sufficient information to evaluate the completeness	Probably low All the outcomes that the study pre-specified in	Probably high No declaration	Low Econometric model was used and sensitivity

	meteorological ground stations. However, no quality control of the temperature data is reported.	and the Russian Fertility and Mortality Database (RusFMD 2016). Also, no quality control of the outcome data is reported.	(time trend) and other confounders		of the outcome data, but the large sample size suggests potential low risk.	the abstract and methods sections are explicitly reported.	of potential conflict of interest found.	analysis checking the robustness of the model is reported.
Pacillo, Kangogo et al. 2022[46]	Probably high The study used monthly temperature data for measuring exposure from Climate Hazards Group InfraRed Precipitation with Station data (CHIRPS). Also, no quality control of the temperature data is reported.	Probably high Outcome data are based on Armed Conflict Location and Event Dataset (ACLED), which is based on media reports. Also, no quality control of the outcome data is reported.	High Structural equation modeling was mainly conducted.	Probably low Included outcomes from Mali.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably low Declared no known competing financial interests.	Probably high The main analysis is done using the SEM approach, and no sensitivity analysis was done.
Peng, Xueming et al. 2011[47]	Probably low The study used daily temperature data from Central Meteorological Station of China. However, no quality control of the temperature data is reported	Low Outcome data are based on daily Beijing Municipal Public Safety Bureau records. Also, the missing dataset was indicated.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Low Figure 3 indicates the number of outcome and average temperature was evenly distributed.	Low About 1 % of low-quality outcome dataset was excluded.	Probably high A lot of the crime dataset was collected, but robbery and burglary were reported.	Low Declared no competing financial interests.	Probably low Regression analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness

								of the model is reported.
Peng and Zhan 2022[48]	Probably low The study used daily temperature data were obtained from the National Meteorological Science Data Center. However, no quality control of the temperature data is reported	High Outcome data are based on annual work reports of local procuratorates in each region. Also, no quality control of the outcome data is reported.	Probably high The study controlled no primary confounders but controlled for other confounders.	Probably low The study included multiple prefecture-level cities in China.	Low The outcome missing dataset was filled by linear interpolation.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably low Declared no known competing financial interests.	Low Regression model was conducted, and the robustness of the model was done.
Potgieter, Fabris-Rotelli et al. 2022[49]	Probably low The study used daily temperature data were obtained from the South African Weather Service. However, no quality control of the temperature data is reported.	Probably low Outcome data are based on daily South African Police Services (SAPS). However, the study does not provide quality assurance of the outcome data.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Probably low The study included outcomes from Khayelitsha.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Low Declared no competing financial interests.	Low Distributed lag non-linear model was conducted, and the robustness of the model was done.
Rahman, Lorenzo et al. 2023[50]	Low The study used daily temperature data from gridded dataset. Also, the validation of the exposure is mentioned.	Low Outcome data are based on daily The California Department of Public Health. Also, the validation of the outcome is mentioned.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Probably low The study included outcomes from California.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests	Low Focused on homicide, which was all reported.	Probably low Declared no known competing financial interests.	Low Distributed lag non-linear model and various regression model was conducted, and the robustness

					potential low risk.			of the model was done.
Ranson 2014[51]	Low The study used daily temperature data from Global Historical Climatology Network Daily (GHCN-Daily) weather data from the National Climatic Data Center. Also, the validation of the exposure is mentioned.	Probably low Outcome data are based on monthly outcome from Uniform Crime Reporting (UCR) data. Also, the validation of the outcome is mentioned.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Low The outcome data covers the law enforcement agencies representing 97.4% of the US population. Figure 1 shows the crime rate and temperature across US.	Low The outcome dataset is highly represented and weighted average was used for missing values.	Low Focused on murder, manslaughter, rape, and other crimes, which was all reported.	Probably high No declaration of potential conflict of interest found.	Low Poisson regression model was conducted, and the robustness of the model was done.
Reeping and Hemenway 2020[52]	Probably high The study used daily temperature data from Weather Underground. Also, there is no validation of the exposure is mentioned.	Probably high Outcome data are based on daily outcome from Chicago Tribune website, which is media-based data. Also, there is no validation of the outcome is mentioned.	Probably high The study controlled no primary confounders but controlled for other confounders.	Probably low Shooting incident from the media was included, however, Figure 2 indicating the temperature and shooting, it was evenly distributed.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low Focused on shooting incident, which was all reported.	Low Declared no competing financial interests.	Probably low Regression analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Rotton and Cohn 2000[53]	Probably low The study used 3-hour interval temperature data	Probably low Outcome data are based on daily calls from the Dallas	Low The study controlled for all primary	Low Figure 4 shows the assault and temperature,	Low The missing dataset was	Low Focused on the aggravated	Probably high No declaration	Probably low Regression analysis was conducted.

	from National Climatic Data Center. However, no quality control of the temperature data is reported.	police department. However, the study does not provide quality assurance of the outcome data.	confounders (time trend and seasonality) and considered different confounders.	which is evenly distributed.	0.06% of the series.	assault police calls, which was all reported.	of potential conflict of interest found.	However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Rotton and Cohn 2000b[54]	Probably low The study used 3-hour interval temperature data from National Climatic Data Center. However, no quality control of the temperature data is reported.	Probably low Outcome data are based on daily calls from the Dallas police department. However, the study does not provide quality assurance of the outcome data.	Low The study controlled for all primary confounders (time trend and seasonality) and considered different confounders.	Low Figure 2 shows the assault and temperature, which is evenly distributed.	Low The missing dataset was replaced with linear interpolation.	Low Focused on the aggravated assault police calls, which was all reported.	Probably high No declaration of potential conflict of interest found.	Probably low Regression analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Ruderman and Cohn 2021[55]	Probably low The study used daily temperature data from National Centers for Environmental Information. However, no quality control of the temperature data is reported.	Probably low Outcome data are based on daily Multiple-Victim Shooting (MVS) dataset from the Gun Violence Archive (GVA). However, the study does not provide quality assurance of the outcome data.	Low The study controlled for all primary confounders (time trend and seasonality) and considered different confounders.	Low Figure 2 shows the rate of MVS and temperature, which is evenly distributed.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low Focused on shooting incident, which was all reported.	Low Declared no competing financial interests.	Probably low Regression analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.

Sanz-Barbero, Linares et al. 2018[56]	Probably low The study used daily temperature data from State Meteorological Agency. However, no quality control of the temperature data is reported.	Probably low Outcome data are based on daily calls to the Intimate Partner Violence (IPV) telephone help line from the Government Delegation for Gender Violence. However, the study does not provide quality assurance of the outcome data.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Probably high The phone calls from the Community of Madrid were included.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low Focused on shooting incident, which was all reported.	Low Declared no competing financial interests.	Probably low Regression analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Schinasi and Hamra 2017[57]	Probably low The study used daily temperature data from the National Centers for Environmental Information. However, no quality control of the temperature data is reported.	Probably low Outcome data are based on daily crime data from Philadelphia Police Department. However, the study does not provide quality assurance of the outcome data.	Low The study controlled for all primary confounders (time trend and seasonality) and considered different confounders.	Probably low The study included outcomes from Philadelphia.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably low Declared no known competing financial interests.	Low Regression model was conducted, and the robustness of the model was done.
Schutte and Breetzke 2018[58]	Probably low The study used daily temperature data from the e South African Weather Service. However, no quality control of	Probably low Outcome data are based on daily South African Police Services (SAPS). However, the study does not provide quality	Probably high The analysis of variance (ANOVA) and spatial point pattern test was used.	Probably high The study included for the top high and top low temperature days.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample	Low Focused on violent, property, and sexual crime, which was all reported.	Low Declared no competing financial interests.	Probably high The main analysis is done using the ANOVA and spatial point pattern test, and no

	the temperature data is reported.	assurance of the outcome data.			size suggests potential low risk.			sensitivity analysis was done.
Schutte, Breetzke et al. 2021[59]	Probably low The study used daily temperature data from the South African Weather Service. However, no quality control of the temperature data is reported.	Probably low Outcome data are based on daily South African Police Services (SAPS). However, the study does not provide quality assurance of the outcome data.	Probably high The study controlled no primary confounders but controlled for other confounders.	Probably low The study included outcomes from Nyanga and Manenberg.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably high No declaration of potential conflict of interest found.	Probably low Regression analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Shen, Hu et al. 2020[60]	Probably high The study used daily temperature data from rp5 website, which is not validated. However, no quality control of the temperature data is reported.	Probably low Outcome data are based on daily crime statistics were provided by the Municipal Public Safety Bureau of Beijing. However, the study does not provide quality assurance of the outcome data.	Probably high The long-term trend analysis and noise analysis was used.	Low Figure A1 and A2 indicates the crime and temperature distribution, which is evenly distributed.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably low Declared no known competing financial interests.	Probably high The main analysis is done using the long-term trend analysis and noise analysis, and no sensitivity analysis was done.
Sommer, Lee et al. 2018[61]	Probably low The study used daily temperature data from Climate Data Online	Probably low Outcome data are based on daily crime incident from Boston Police	Probably low The study controlled for some primary confounders	Probably low The study included outcomes from Boston.	Probably low No sufficient information to evaluate the completeness	Probably high Among the various violent	Probably low Declared no known competing	Probably low Causal analysis was conducted, and some sensitivity

	provided by the National Oceanic and Atmospheric Administration. However, no quality control of the temperature data is reported.	Department. However, the study does not provide quality assurance of the outcome data.	(seasonality) and other confounders.		of the outcome data, but the large sample size suggests potential low risk.	crimes, the study focused on the aggravated assault and larceny counts.	financial interests.	analysis was reported.
Sorg and Taylor 2011[62]	Probably high The study used monthly temperature data from Weather Underground. Also, there is no validation of the exposure is mentioned.	Probably high Outcome data are based on monthly street robbery from Philadelphia police department. Also, there is no validation of the outcome is mentioned.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Probably low The study included outcomes from Philadelphia.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low Focused on street robbery, which was all reported.	Probably high No declaration of potential conflict of interest found.	Probably low Various multilevel model analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Stechemesser, Levermann et al. 2022[63]	Probably low The study used daily temperature data from the fifth generation European Centre for Medium-Range Weather Forecasts global climate and weather reanalysis dataset. However, there is no	Probably low Outcome data are based on machine learning approach to identify hate from the daily tweets. Also, the validation of the outcome is mentioned.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Probably high The study has sampled from the 1% Twitter stream.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low Focused on number of hate tweets, which was all reported.	Probably low Declared no known competing financial interests.	Probably low Fixed-effects panel-regression model analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness

	validation of the exposure is mentioned.							of the model is reported.
Stevens, Beggs et al. 2019[64]	Probably low The study used daily temperature data from Australian Water Availability Project (AWAP). However, there is no validation of the exposure is mentioned.	Probably low Outcome data are from New South Wales Department of Justice, Bureau of Crime Statistics and Research. However, the validation of the outcome is mentioned.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Low Figure 3 and Figure 4 represents the temperature and outcome distribution.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low Focused on assault, theft, and fraud, which was all reported.	Probably high No declaration of potential conflict of interest found.	Probably low Linear regression model analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Stevens, Graham et al. 2021[65]	Probably low The study used daily gridded temperature data from the Australian Water Availability Project (AWAP). However, there is no validation of the exposure is mentioned.	Probably low Outcome data are based on “We Feel” tool to identify hate from the daily tweets and assaults from New South Wales (NSW) Department of Justice.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Probably high Only the English tweets were selected.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably high The 10 highest and lowest angry tweet count days were selected for the analysis.	Low Declared no competing financial interests.	Probably low Negative binomial regression analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Stevens, Graham et al. 2023[66]	Probably low The study used daily temperature	Probably low Outcome data are from New South	Probably low The study controlled for	Probably low The study included	Probably low No sufficient information to	Probably low All the outcomes that	Low Declared no	Probably low Negative binomial

	data from Australian Water Availability Project (AWAP). However, there is no validation of the exposure is mentioned.	Wales Department of Justice, Bureau of Crime Statistics and Research. However, the validation of the outcome is mentioned.	some primary confounders (time trend) and other confounders.	outcomes from New South Wales.	evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	the study pre-specified in the abstract and methods sections are explicitly reported.	competing financial interests.	regression analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Takahashi 2017[67]	Probably low The study used mean temperature from Japan Meteorological Agency. However, no quality control of the temperature data is reported.	Probably high Outcome data are based on the monthly Statistics Bureau. However, no quality control of the outcome data is reported.	Probably low The study did control for some primary confounders and other confounders.	Low The annual crime/violence counts that are presented on Figure 1 show a reasonable distribution, hence providing evidence that inclusion of crime/violence in each time period is not based on any factor associated with the exposure.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Low Focused on violent crimes, which was all reported.	Probably low Regression model was conducted. However, there is no sensitivity analysis.
Talaei, Hedjazi et al. 2014[68]	Probably low The study used daily temperature data from Information Technology (IT)	Probably low Outcome data are homicide, rage, and suicidal attempts from Legal Medicine	Probably high The study has used correlation, ANOVA, and post hoc analysis.	Probably low The study included outcomes from Mashhad.	Probably low No sufficient information to evaluate the completeness of the outcome	Probably low All the outcomes that the study pre-specified in the abstract	Probably high No declaration of potential	Probably high Regression analysis and sensitivity analysis should be conducted.

	department of Iran Meteorological Organization. However, there is no validation of the exposure is mentioned.	Organization. However, the validation of the outcome is mentioned.			data, but the large sample size suggests potential low risk.	and methods sections are explicitly reported.	conflict of interest found	
Tiihonen, Halonen et al. 2017[69]	Probably high The study used monthly temperature data from Statistics Centre of Finland. Also, there is no validation of the exposure is mentioned.	Probably low Outcome data are from Finnish Meteorological Institute's measurement station, in a monthly basis. Also, the validation of the outcome is mentioned.	Probably high The study did not control for primary confounders.	Low Figure 2 represents the temperature and violent crime distribution.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low Focused on violent crimes, which was all reported.	Low Declared no competing financial interests.	Probably low Random-effects Poisson regression analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Tol and Wagner 2010[70]	Probably high The study used annual gridded temperature data from the NOAA paleoclimate webpage. Also, there is no validation of the exposure is mentioned.	Probably high Outcome data are based on annual conflicts from Uppsala Conflict Data. Also, there is no validation of the outcome is mentioned.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Low Figure 2 represents the correlation between temperature and war conflicts.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low Focused on war conflicts, which was all reported.	Probably high No declaration of potential conflict of interest found.	Probably low Regression model analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.

Towers, Chen et al. 2018[71]	Probably low The study used daily temperature data from Weather Underground website. However, there is no validation of the exposure is mentioned.	Probably low Outcome data are from Chicago Police Department's CLEAR (Citizen Law Enforcement Analysis and Reporting). However, the validation of the outcome is mentioned.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Probably low The study included outcomes from Chicago.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably high No declaration of potential conflict of interest found.	Probably low Regression model analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Trujillo and Howley 2021[72]	Probably low The study used daily temperature data from Colombian Institute of Hydrology, Meteorology and Environmental Studies (IDEAM). However, there is no validation of the exposure is mentioned.	Probably low Outcome data are from Legal Medicine and Forensic Studies (INMLCF). However, the validation of the outcome is mentioned.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Low Figure 1 shows the distribution of homicide and temperature is evenly distributed.	Low The study's missing dataset was 1.76% for the exposure dataset.	Low Focused on homicide and interpersonal violence, which was all reported.	Probably low Declared no known competing financial interests.	Low Regression model was conducted, and the robustness of the model was done.
van de Vliert, Schwartz et al. 1999[73]	Probably high The study used annual temperature data from National	Probably high Outcome data are from annual political violence from World	Probably high The study did not control for all primary confounders.	Probably high The countries included were based on records of political	Probably low No sufficient information to evaluate the completeness	Probably low All the outcomes that the study pre-specified in	Probably low Declared no known competing	Probably high The main analysis was correlation and hierarchical

	Geographic Atlas of the World. Also, there is no validation of the exposure is mentioned.	Handbook of Political and Social Indicators. Also, the validation of the outcome is mentioned.		violence from the World Handbook of Political and Social Indicators.	of the outcome data, but the large sample size suggests potential low risk.	the abstract and methods sections are explicitly reported.	financial interests.	regression, and no sensitivity analysis was conducted.
van Weezel 2020[74]	Probably low The study aggregated monthly temperature to annual temperature data from Berkeley Earth Surface Temperature (BEST) dataset. However, the validation of the exposure is mentioned.	Probably high Outcome data are from annual conflict from Georeferenced Event Dataset (GED, version 18.1) from the Uppsala Conflict Data Programme. However, the validation of the outcome is mentioned.	Probably high The study did not control for all primary confounders.	Probably low The study included outcomes from Africa.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Low Declared no competing financial interests.	Probably low Various analysis and robustness check was conducted.
Wei, Shao et al. 2022[75]	Probably high The study used annual temperature data from World Bank. Also, there is no validation of the exposure is mentioned.	Probably high Outcome data are from annual homicide from the World Bank. Also, there is no validation of the outcome is mentioned.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Probably low The study included outcomes from 171 countries.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low The study focused on the natural hazard and homicide.	Probably low Declared no known competing financial interests.	Low Fixed-effect regression model was conducted, and the robustness of the model was done.
Wesselbaum 2022[76]	Probably low	Probably low	Probably low	Low	Probably low	Probably low	Low	Probably low

	The study used daily temperature data from NOAA's Local Climatological Data set (LCD). However, there is no validation of the exposure is mentioned.	Outcome data are from New York City OpenData platform in the historic NYPD Complaint data set. However, the validation of the outcome is mentioned.	The study controlled for some primary confounders (time trend) and other confounders.	Figure 2 indicating the temperature and violent crimes were evenly distributed.	No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Declared no competing financial interests.	Regression model analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Williams, McDonogh-Wong et al. 2020[77]	Probably low The study used daily temperature data from NOAA. However, there is no validation of the exposure is mentioned.	Probably low Outcome data are from public database and city agencies. However, the validation of the outcome is mentioned.	Low The study controlled for all primary confounders and other confounders.	Probably low The study included outcomes from 23 cities from US.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Low Declared no competing financial interests.	Probably low Generalized additives model analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Williams, Allen et al. 2020[78]	Probably low The study used daily temperature data from Boston Logan International Airport. However, there is no validation of the	Probably low Outcome data are from Boston Police Department. However, the validation of the outcome is mentioned.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Probably low The study included outcomes from Boston.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Low Declared no competing financial interests.	Probably low Regression analysis was conducted. However, no tests or sensitivity analysis for checking the appropriateness

	exposure is mentioned.				potential low risk.			of the model is reported.
Williams, Hill et al. 2015[79]	Low The study used daily temperature data from National Institute of Water and Atmospheric Research (NIWA n.d.). Also, the missing dataset was mentioned.	Low Outcome data are from New Zealand Police. Also the details of the outcome is mentioned in the Supplementary files.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Low Figure 1 indicated the temperature and assaults are evenly distributed.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably high No declaration of potential conflict of interest found.	Low Regression model was conducted, and the sensitivity analysis was done.
Wu, Lee et al. 2020[80]	Probably low The study used temperature data from National Climatic Data Center and National Oceanic and Atmospheric Administration. However, there is no validation of the exposure is mentioned.	Probably low Outcome data are from United States Federal Bureau of Investigation (FBI) Uniform Crime Reporting (UCR).	High The study conducted the multiple linear regression with no confounders.	Low Figure 2 indicated the temperature and outcome are evenly distributed.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Low Declared no competing financial interests.	Probably high The study's main analysis was multiple linear regression analysis and wavelet coherence analysis. Also, no sensitivity analysis was done.
Xu, Xiong et al. 2020[81]	Low The study used daily gridded temperature data from Parameter–Elevation	Low Outcome data are from Crime Open Database (CODE) and the details of	Low The study controlled for all primary confounders and	Probably low The study included outcomes for large US cities.	Probably low No sufficient information to evaluate the completeness of the outcome	Probably low All the outcomes that the study pre-specified in the abstract	Low Declared no competing financial interests.	Low Case-crossover analysis was conducted. Also, the sensitivity

	Regressions on Independent Slopes Model (PRISM). Also, the validation of the exposure is mentioned.	the dataset was provided.	other confounders.		data, but the large sample size suggests potential low risk.	and methods sections are explicitly reported.		analysis for checking the appropriateness of the model is reported.
Yiannakoulias and Kielasinska 2016[82]	Probably low The study used daily temperature data from Environment Canada. However, there is no validation of the exposure is mentioned.	Probably low Outcome data are from Ontario Office of the Fire Marshal (OFM). However, the validation of the outcome is mentioned.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Probably low The study included outcomes for Toronto.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low Focused on arson, which is reported.	Low Declared no competing financial interests.	Probably low Poisson generalized linear mixed model (GLMM) was conducted. However, no tests or sensitivity analysis for checking the appropriateness of the model is reported.
Yu, Mu et al. 2017[83]	Probably low The study used daily temperature data from Central Weather Bureau. However, there is no validation of the exposure is mentioned.	Probably low Outcome data are from National Police Agency. However, the validation of the outcome is mentioned.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Probably low The study included outcomes for Taiwan.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Probably low All the outcomes that the study pre-specified in the abstract and methods sections are explicitly reported.	Probably high No declaration of potential conflict of interest found.	Low Negative binomial regression analysis was conducted. Also, the sensitivity analysis for checking the robustness of

								the model is reported.
Zhu, He et al. 2023[84]	Probably low The study used daily gridded temperature data. However, there is no validation of the exposure is mentioned.	Probably high Outcome data are from Demographic and Health Surveys (DHS). It was based on interview questions, which could have biased results in collecting Intimate Partner Violence dataset.	Probably low The study controlled for some primary confounders (time trend) and other confounders.	Probably high The study included outcomes for only the women.	Probably low No sufficient information to evaluate the completeness of the outcome data, but the large sample size suggests potential low risk.	Low Focused on the intimate partner violence, which was all represented.	Probably low Declared no known competing financial interests.	Low multivariable mixed-effects logistic regression analysis was conducted. Also, the sensitivity analysis for checking the robustness of the model is reported.

Table S8. Summary of the studies included in meta-analysis and sensitivity analysis for systematic literature review of the association between temperature, crime and violence

Study	Study region	Relative Risk[a] (95% CI)	Pooled Relative Risk[b] (95% CI)
Short-term			
Violent crime			
Baryshnikova, Davidson et al. 2022[5]	4 cities in USA	1.009 (1.007, 1.011)	1.017 (1.002, 1.033)
Berman, Bayham et al. 2020[6]	436 counties in USA	1.013 (0.808, 1.218)	1.015 (1.003, 1.028)
Cruz, D'Alessio et al. 2023[14]	Cleveland, Ohio, USA	1.043 (1.026, 1.059)	1.008 (1.006, 1.011)
Le, Berman et al. 2022[26]	Hanoi, Vietnam	1.104 (0.997, 1.211)	1.009 (1.007, 1.011)
Michel, Wang et al. 2016[41]	Baltimore, Maryland, USA	1.008 (1.006, 1.010)	1.018 (1.002, 1.033)
Potgieter, Fabris-Rotelli et al. 2022[49]	Developing township of Khayelitsha, in the Western Cape Province of South Africa	1.021 (1.009, 1.033)	1.009 (1.008, 1.011)
Wesselbaum 2022[76]	New York, USA	0.993 (0.987, 1.000)	1.011 (1.008, 1.013)
Yu, Mu et al. 2017[83]	Taiwan	1.019 (1.012, 1.025)	1.008 (1.006, 1.010)
Overall	-	1.009 (1.007, 1.011)	-
Property crime			
Baryshnikova, Davidson et al. 2022[5]	4 cities in USA	1.006 (1.004, 1.008)	0.996 (0.980, 1.012)
Berman, Bayham et al. 2020[6]	436 counties in USA	1.006 (0.851, 1.161)	0.998 (0.985, 1.011)
Le, Berman et al. 2022[26]	Hanoi, Vietnam	1.071 (1.005, 1.137)	0.996 (0.984, 1.007)
Potgieter, Fabris-Rotelli et al. 2022[49]	Developing township of Khayelitsha, in the Western Cape Province of South Africa	0.978 (0.967, 0.988)	1.003 (0.999, 1.007)
Yu, Mu et al. 2017[83]	Taiwan	1.002 (1.000, 1.004)	0.998 (0.979, 1.017)
Overall	-	1.001 (0.997, 1.005)	-
Assault			
Jung, Kim et al. 2020[23]	Seoul, South Korea	1.101 (1.092, 1.110)	1.012 (1.004, 1.019)
Lemon and Partridge 2017[27]	Dorset, UK	1.010 (1.000, 1.020)	1.022 (0.988, 1.056)
Mapou, Shendell et al. 2017[34]	Chicago, Houston, Philadelphia, and Seattle, USA	1.029 (1.015, 1.043)	1.019 (0.984, 1.053)
Rotton and Cohn 2000[54]	Dallas, Texas, USA	1.028 (0.897, 1.160)	1.020 (0.990, 1.051)
Stevens, Beggs et al. 2019[64]	New South Wales, Australia	1.005 (1.005, 1.006)	1.023 (0.989, 1.057)
Stevens, Graham et al. 2021[65]	New South Wales, Australia	0.957 (0.901, 1.013)	1.028 (0.999, 1.056)
Williams, Hill et al. 2015[79]	New Zealand	1.002 (0.974, 1.030)	1.023 (0.990, 1.057)
Yu, Mu et al. 2017[83]	Taiwan	1.015 (1.013, 1.017)	1.021 (0.987, 1.056)
Overall	-	1.021 (0.991, 1.050)	-

Homicide			
Gates, Klein et al. 2019[18]	South Africa	1.021 (1.018, 1.024)	1.006 (1.000, 1.013)
Mapou, Shendell et al. 2017[34]	Chicago, Houston, Philadelphia, and Seattle, USA	1.034 (0.960, 1.107)	1.011 (1.002, 1.020)
Michel, Wang et al. 2016[41]	Baltimore, Maryland, USA	1.006 (0.998, 1.014)	1.013 (1.002, 1.024)
Rahman, Lorenzo et al. 2023[50]	California, USA	1.009 (1.003, 1.015)	1.012 (1.001, 1.024)
Trujillo and Howley 2021[72]	Barranquilla, Colombia	1.006 (0.980, 1.032)	1.012 (1.002, 1.022)
Wesselbaum 2022[76]	New York, USA	1.000 (1.000, 1.000)	1.014 (1.005, 1.023)
Xu, Xiong et al. 2020[81]	9 cities, USA	1.042 (1.011, 1.073)	1.009 (1.001, 1.017)
Overall	-	1.011 (1.002, 1.020)	-
Long-term			
Homicide			
Algahtany, Kumar et al. 2022 -a[2]	Riyadh, Saudi Arabia	1.013 (1.012, 1.013)	1.037 (0.993, 1.080)
Algahtany, Kumar et al. 2022 -b[2]	Makkah, Saudi Arabia	1.004 (1.002, 1.005)	1.038 (0.995, 1.081)
Li, Feng et al. 2023[28]	140 countries and regions	1.021 (1.021, 1.021)	1.035 (0.991, 1.079)
Lynch, Stretesky et al. 2020 -a[31]	New York, USA	1.000 (1.000, 1.000)	1.039 (0.996, 1.081)
Lynch, Stretesky et al. 2020 -b[31]	London, UK	1.000 (1.000, 1.000)	1.039 (0.996, 1.081)
Mares and Moffett 2016[37]	57 countries	1.057 (1.035, 1.080)	1.029 (0.986, 1.073)
Wei, Shao et al. 2022[75]	171 countries	1.139 (1.132, 1.146)	1.037 (0.993, 1.080)
Overall	-	1.030 (0.990, 1.053)	-

[a] Crime/violence risk for 1◦C increase; [b] Pooled percentage increase after excluding the effect estimates

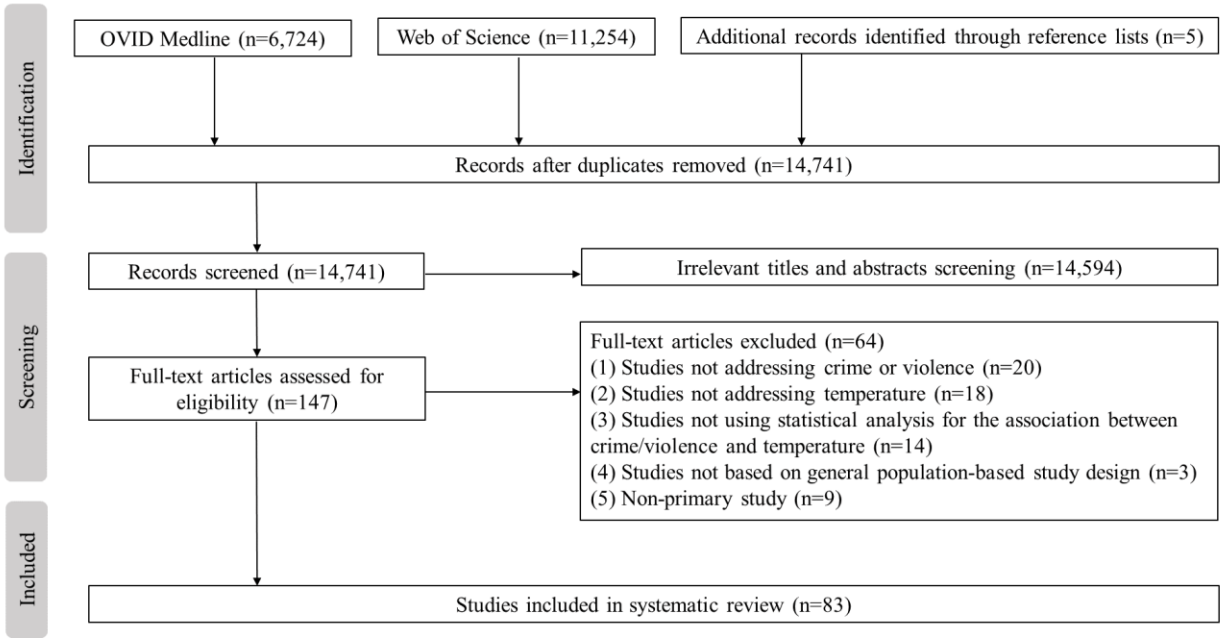

Figure S1. Flowchart of the study selection for systematic literature review of the association between temperature, crime and violence.

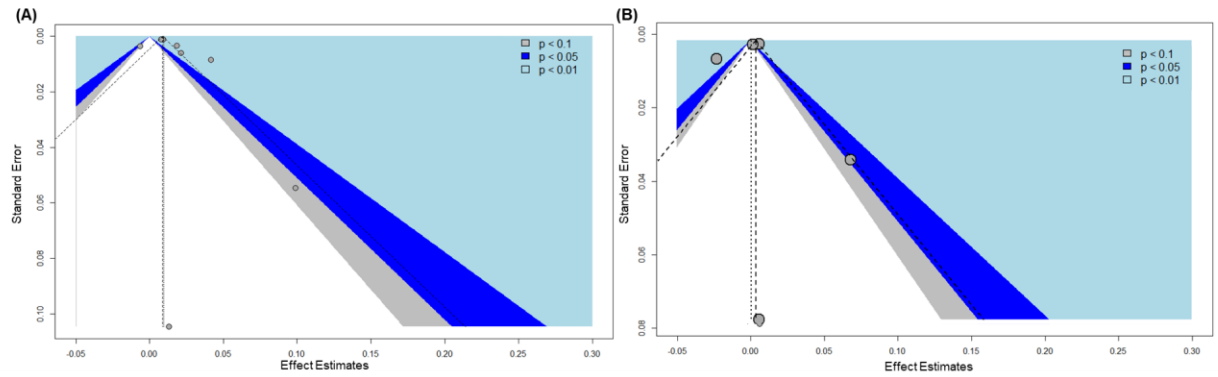

Figure S2. Contour-enhanced funnel plot analysis on the detection of publication bias in the meta-analysis of the short-term association between temperature and (A) violent crime and (B) property crime with background color indicating the significance of the studies ($P \geq 0.05$: white background; $P < 0.05$: dark blue; $P < 0.025$: blue; $P < 0.01$: light blue)

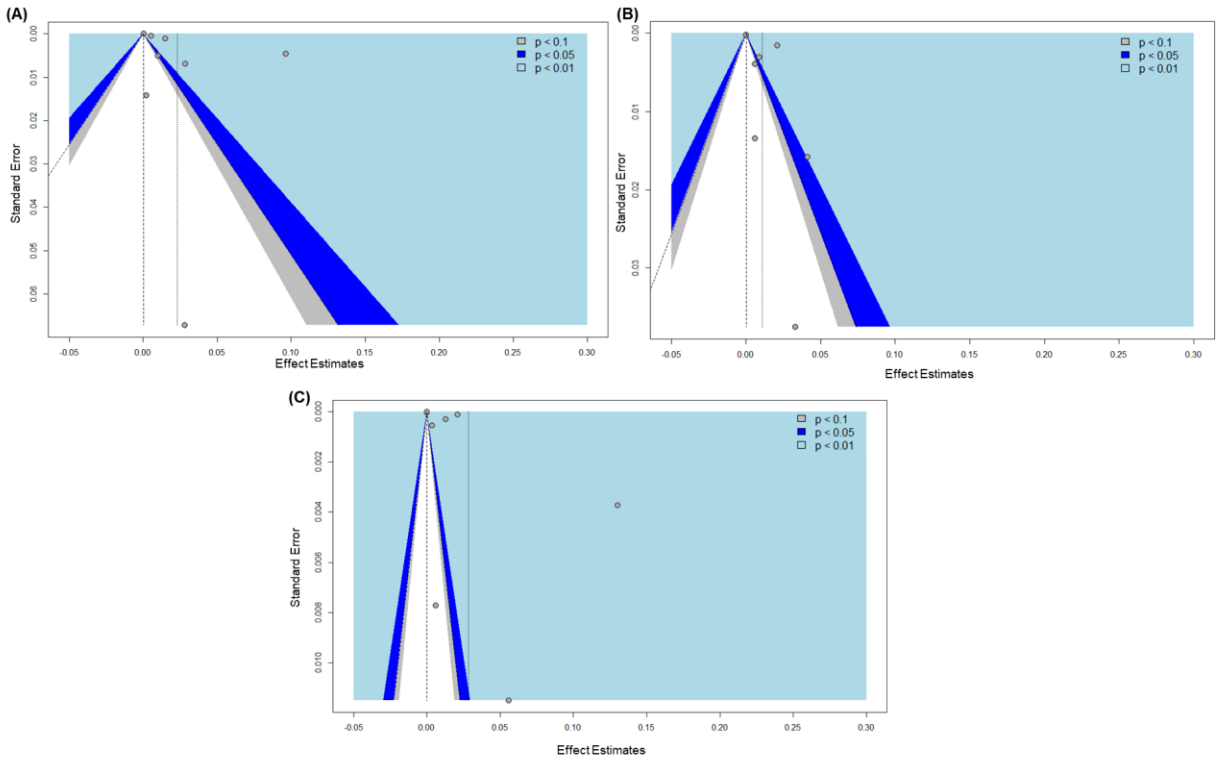

Figure S3. Contour-enhanced funnel plot analysis on the detection of publication bias in the meta-analysis of the short-term association between temperature and assault and homicide (A and B for assault and homicide, respectively) and C for long-term homicide, with background color indicating the significance of the studies ($P \geq 0.05$: white background; $P < 0.05$: dark blue; $P < 0.025$: blue; $P < 0.01$: light blue)

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