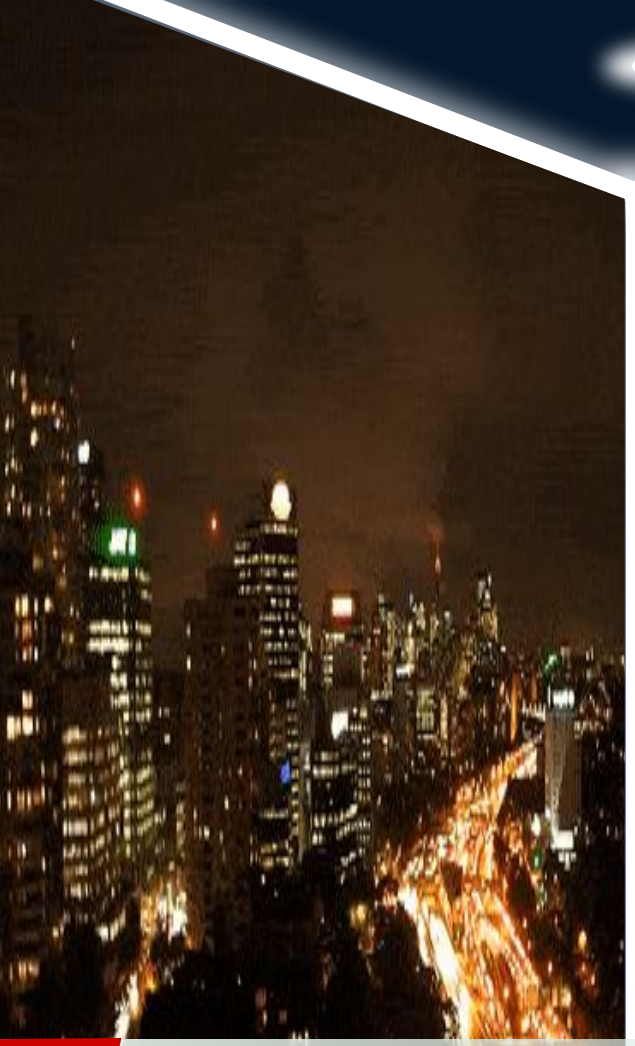


# DOES TEMPERATURE PREDICT CRIME FREQUENCY?

## WEATHER & CRIME IN CHICAGO LIVE

TEAM-MAX Claire Ziemba, Crysta Germany, Quindlan Kelleher, Avery Mack

# DOES WEATHER DRIVE CRIME?

LIVE

NEWS CHICAGO

- Chicago averages 500-700 crimes per day
- The "Heat Hypothesis" (Anderson et al., 2001): warmer temperatures → more outdoor activity → more crime

**Research Question:** Does daily maximum temperature affect the number of crimes reported in Chicago, and does this relationship differ between violent and property crimes?

**Hypothesis:** Higher temperatures → more crimes overall, with a stronger effect for violent crimes

# OUR DATA

**Crime Data**
- Chicago Data Portal
- Chicago Police Dept
- Feb 2025 – Feb 2026
- 233,269 incidents

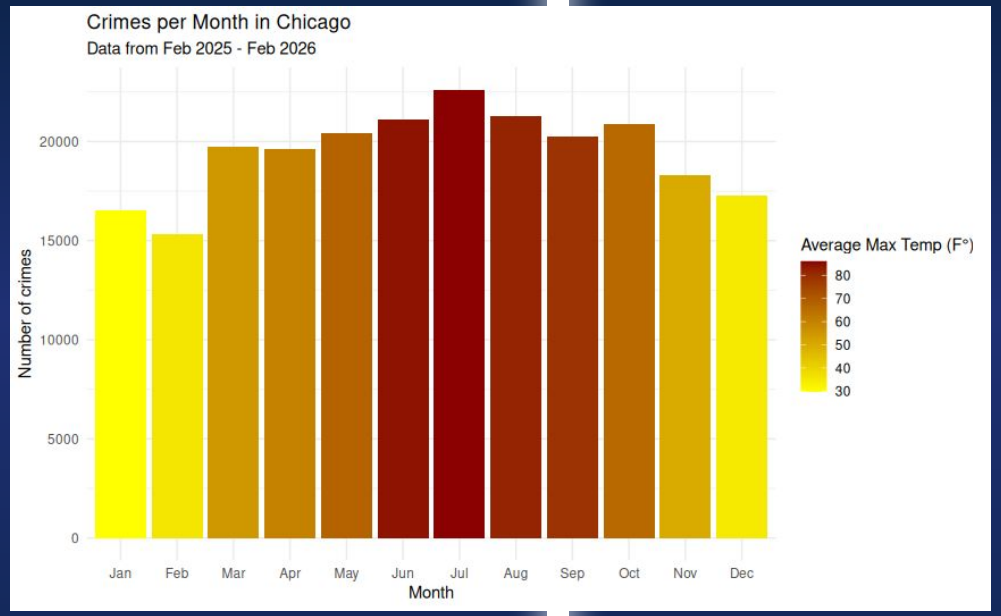
**Weather Data**
- NOAA Climate Data Online
- O'Hare Airport Station
- Feb 2025 – Feb 2026
- 365 daily summaries

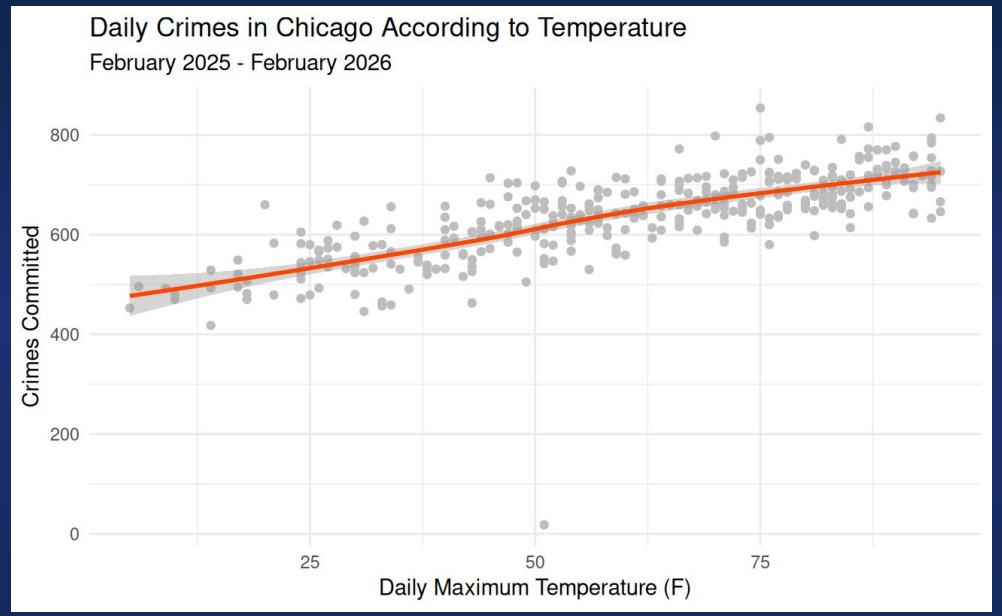
*merged by date → 1 row per crime with that day's weather conditions

**Key variables:**
- tmax — daily maximum temperature (°F)
- crime_type — violent / property / other

Violent: battery, assault, robbery, homicide...
Property: theft, burglary, motor vehicle theft...
Other: all remaining categories (narcotics

# CRIME PEAKS IN SUMMER

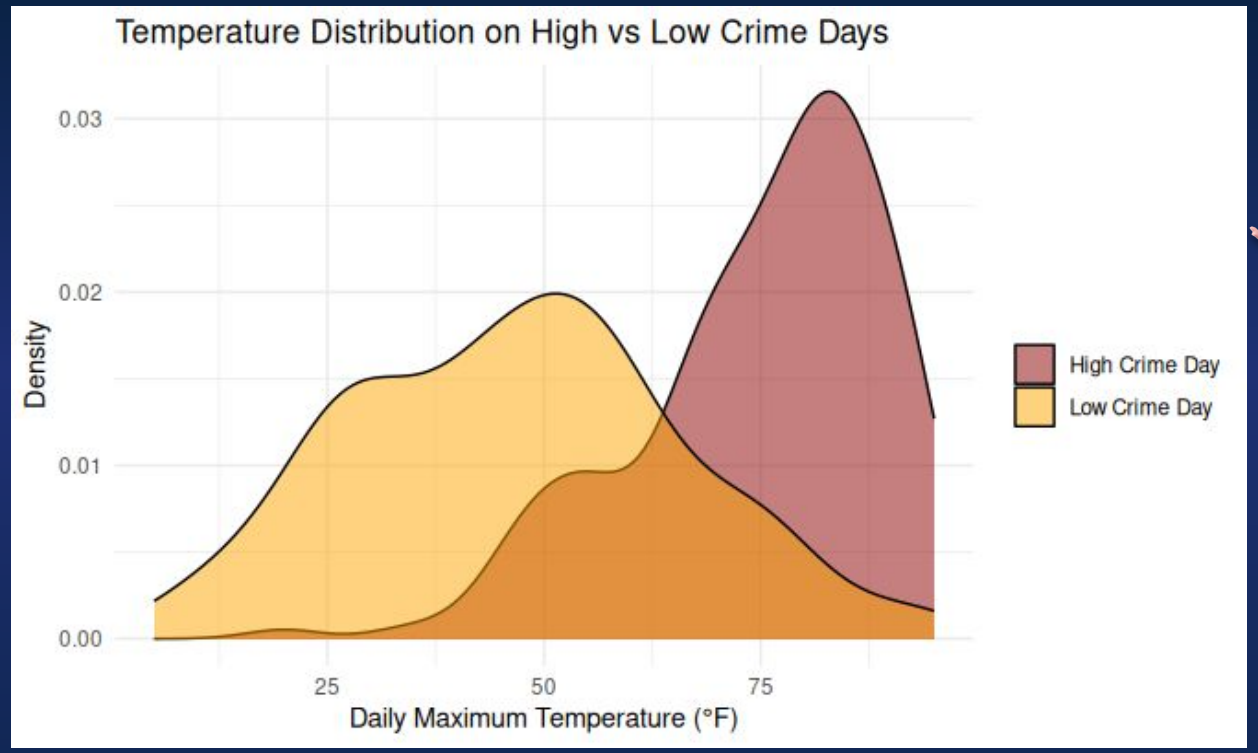


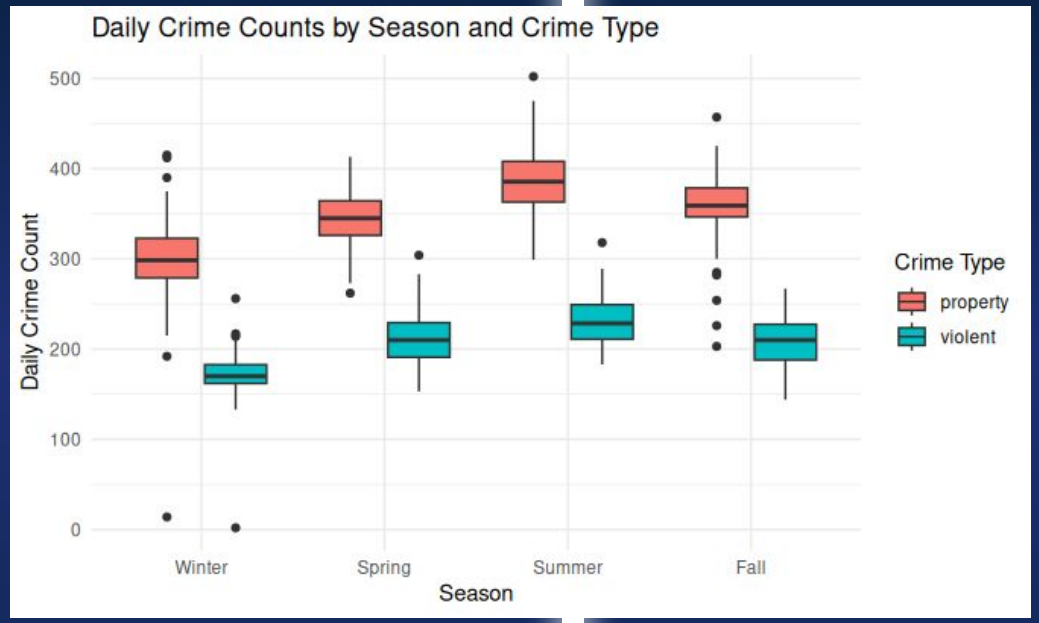

- Unimodal
- July peak: ~23,000 crimes
- February low: ~15,300 crimes
- Color gradient mirrors temperature pattern (darker red is hotter, yellow is cooler)

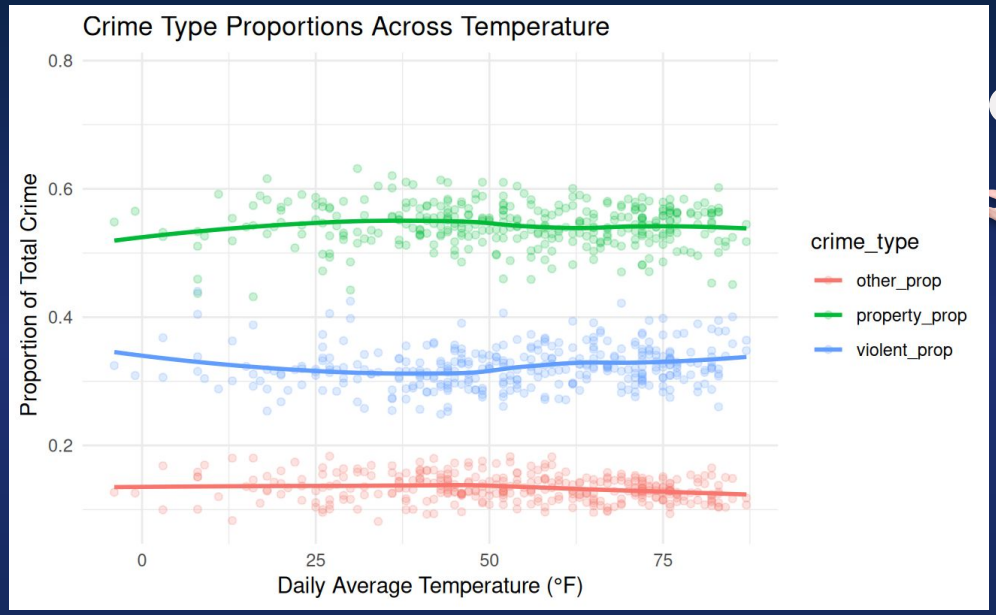
# HIGH CRIME DAYS ARE HOTTER

- Multimodal, left-skewed distributions
- High Crime days more left-skewed
- Low crime days more evenly distributed
- High Crime days peak ~ 80° F
- Low crime days peak ~ 25° F and ~ 50° F




# TEMPERATURE SHIFTS VOLUME, NOT TYPE




**Left — Daily Counts by Season:**
- Both crime types increase in summer
- Property always higher than violent
- Median property crimes: ~300-400/day
- Median violent crimes: ~175-235/day

**Right — Proportions Across Temperature:**
- Property: ~50% at ALL temperatures
- Violent: ~30% at ALL temperatures
- Trend lines nearly flat across full temperature range

# What We Learned

**Conclusions:**

✓ Temperature strongly associated with overall crime frequency

✓ High crime days are significantly hotter than low crime days

✓ Both crime types increase in summer

✓ Temperature shifts crime volume but not crime composition: our hypothesis was partially wrong

| season | Mean Daily Crimes | Mean Max Temp (**°F**) |
|---|---|---|
| Winter | 545 | 33.0 |
| Spring | 650 | 60.7 |
| Summer | 706 | 83.9 |
| Fall | 653 | 64.8 |

**Limitations:** - Only reported crimes captured

- Single weather station for all of Chicago - Seasonal confounders not controlled for (school schedules, day length) - Correlation ≠ causation

**Future work:** Add precipitation, control for day of week, extend time range

# Bibliography

Anderson, C. A., Anderson, K. B., Dorr, N., DeNeve, K. M., & Flanagan, M. (2000). Temperature and aggression. In *Advances in Experimental Social Psychology* (Vol. 32, pp. 63–133). Elsevier. https://doi.org/10.1016/S0065-2601(00)80004-0