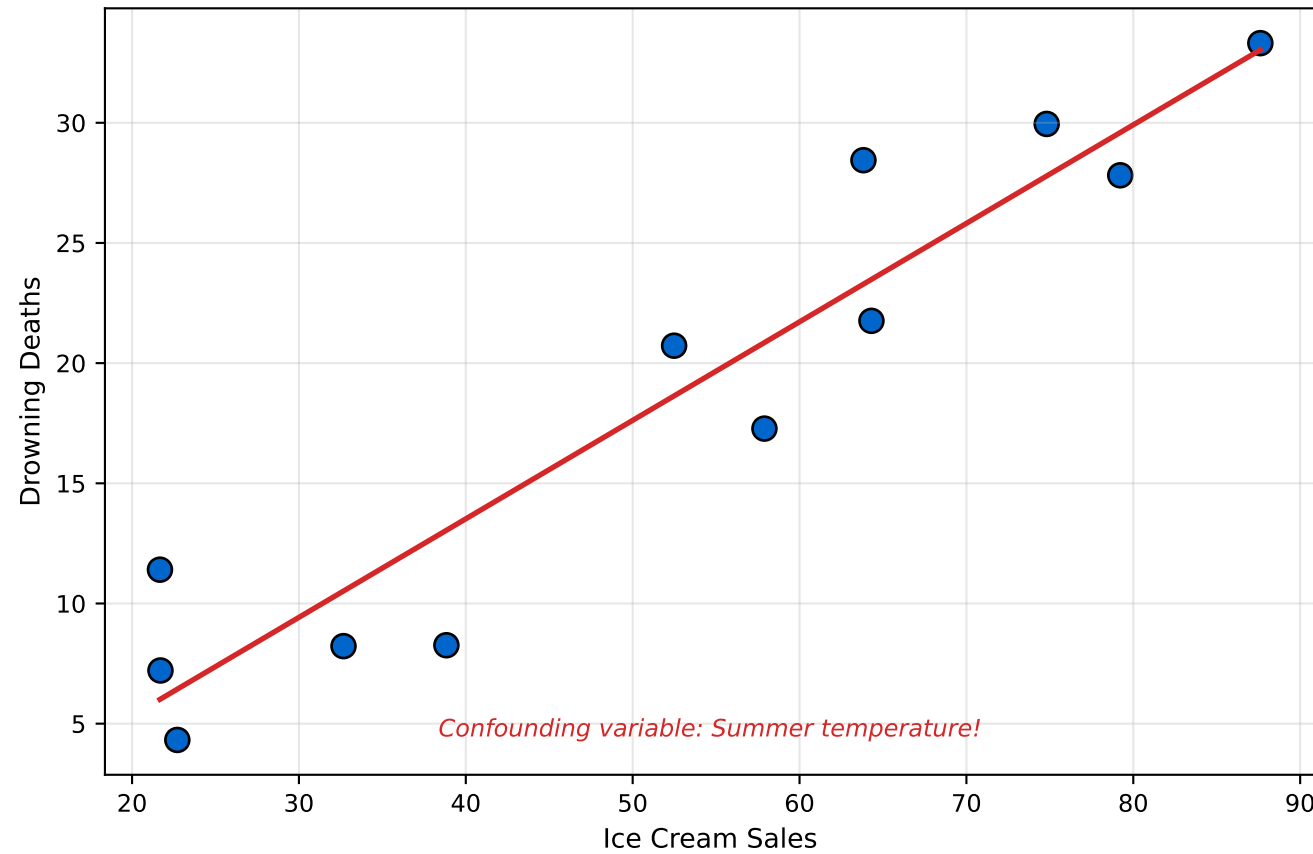
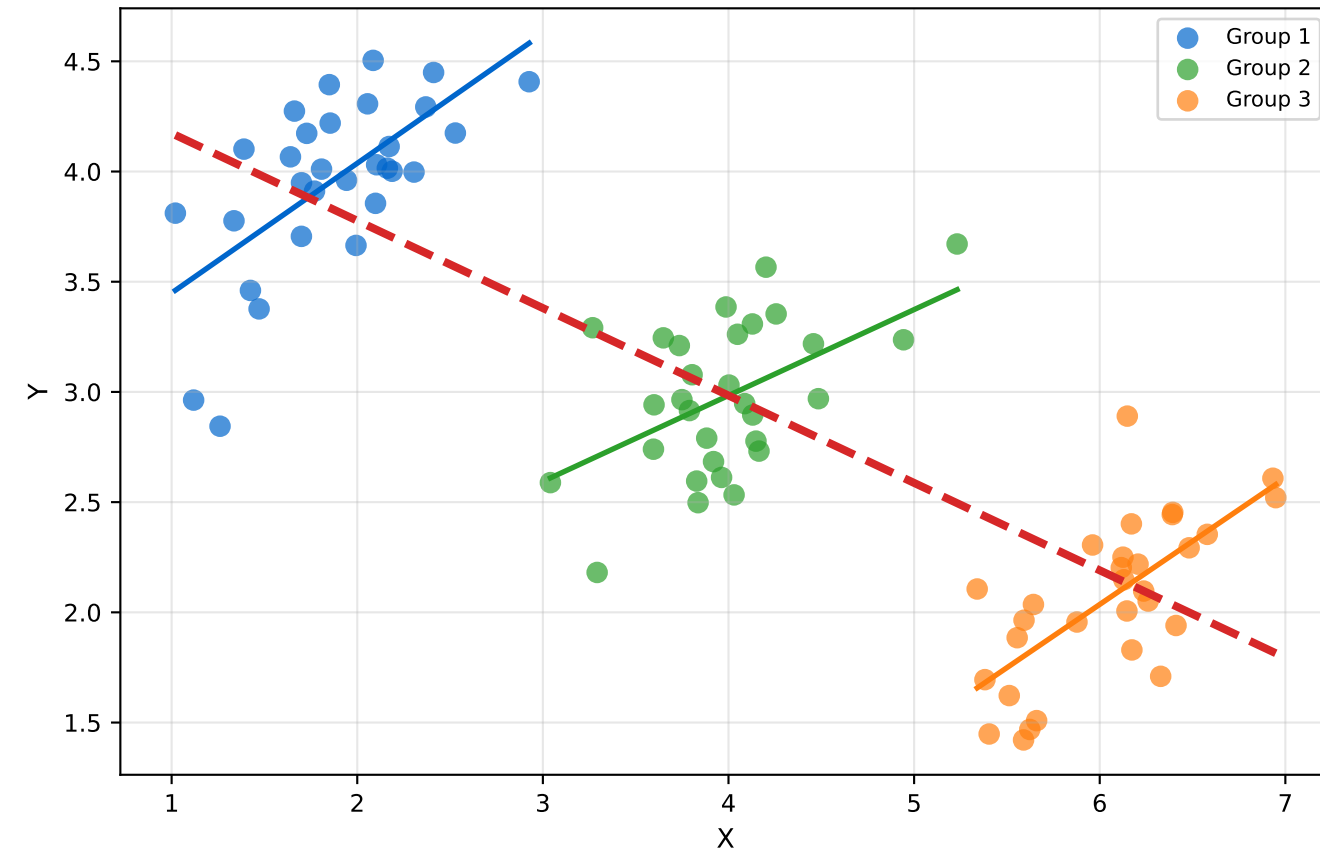


## Spurious Correlations: When r Lies

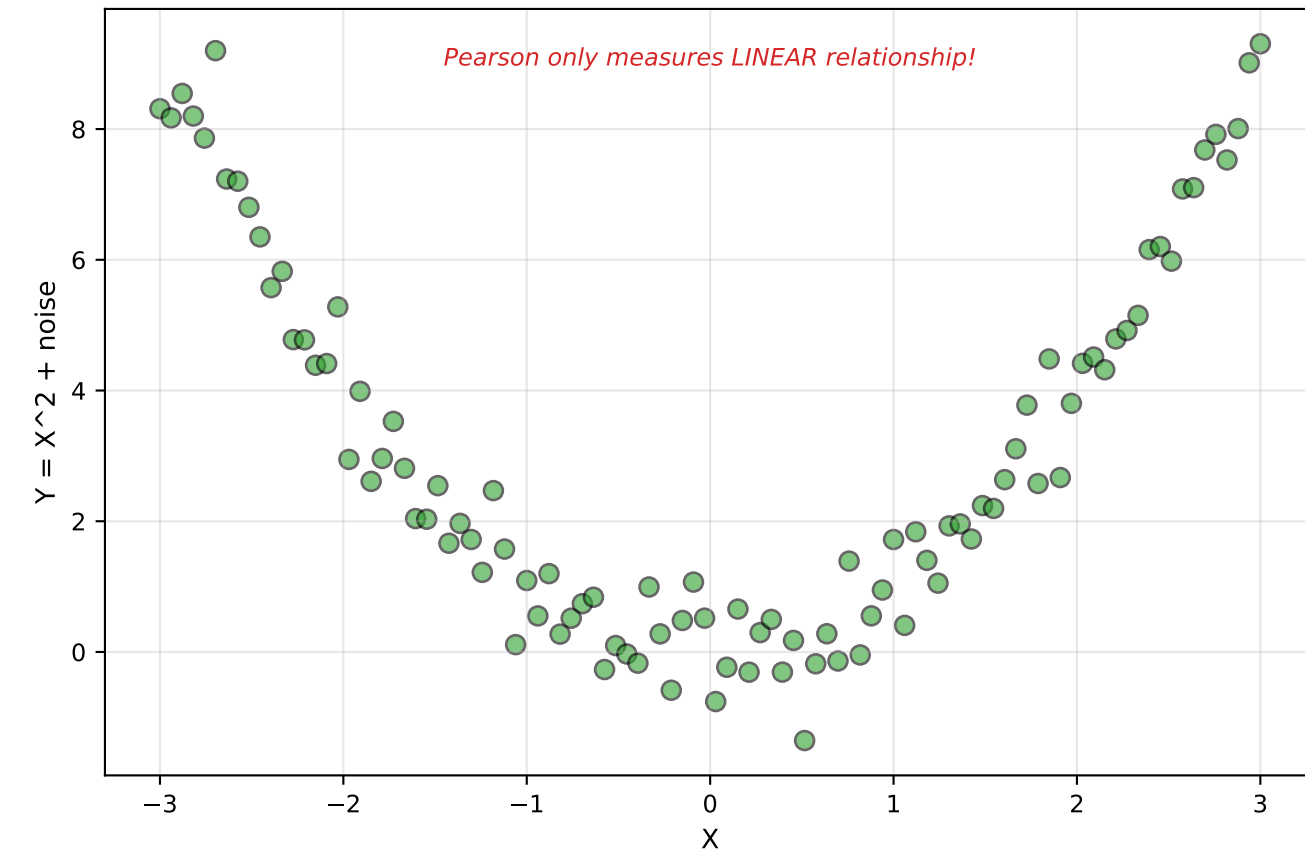
Ice Cream vs Drownings ( $r = 0.95$ )



Simpson's Paradox (Overall  $r = -0.81$ )



Non-linear:  $r = -0.01$  (but clearly related!)



## Correlation Pitfalls

- Confounding Variables:** Both X and Y caused by hidden Z
- Simpson's Paradox:** Trend reverses when data is grouped
- Non-linearity:**  $r = 0$  does not mean no relationship
- Outliers:** Single point can dominate correlation
- Coincidence:** Random correlations in large datasets

*Always visualize your data before trusting correlation!*