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Has the Weather Got You Down? The Impact of Temperature on Mental Health

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Has the Weather Got You Down? The Impact of Temperature on Mental Health

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Introduction

- As one of the most important factors affected by climate change, human health is now recognized as a global research priority (Deschenes 2014).
- An emerging literature on the economics of heat stress provides estimates of nontrivial, negative impacts of hot days on a wide set of outcomes (Heal and Park, 2016).
- **But what is the impact of temperature on the mental health of the general population of the US?**

Objective

- To propose a theoretical framework of how temperature affects mental health from which we can derive welfare estimates.
- To provide the first estimates of the impact of daily temperature fluctuations on self-reports of poor mental health for a large, representative sample of the U.S population over the period 1993 to 2012.

Data

- Mental health and demographics: Behavioral Risk Factor Surveillance System (BRFSS) by the Centers for Disease Control and Prevention (CDC)

Mental health question: thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?

- Temperature and meteorological controls: Parameter-elevation Regressions on Independent Slopes Model (PRISM) by Climate Group from Oregon University.

Conceptual Framework

- We assume individuals maximize utility over the consumption of a single numeraire good X_c and mental health MH. We further assume that MH is produced with a vector of mental health-maintaining market goods X_m with price p and depends upon temperature T. The purchase of market goods is constrained by income I.

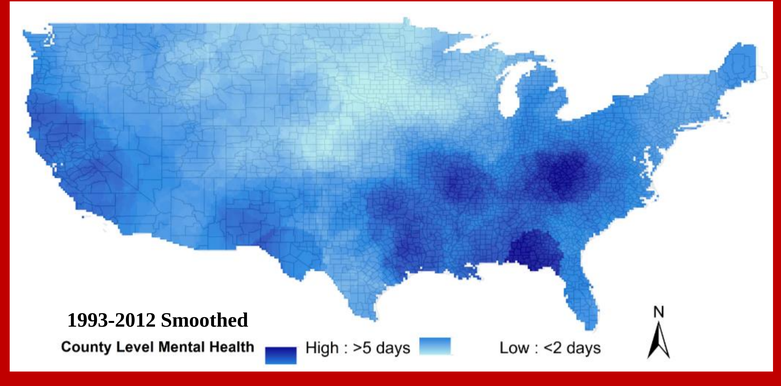
$$V = U(X_c, f(X_m, T)) + \lambda(I - X_c - pX_m).$$

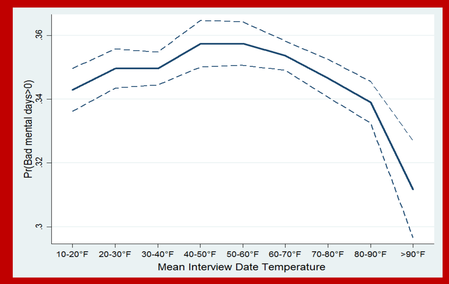
$$\left.\frac{d^* X_m}{dT}\right|_{du=0} = -\frac{\frac{\partial U}{\partial f}/\lambda\frac{df}{dT} - p\frac{\partial X_m}{\partial T}}{\frac{\partial U}{\partial f}/\lambda\frac{\partial f}{\partial X_m} - p}. \qquad \left.\frac{d^* I}{dT}\right|_{du=0} = -\frac{df}{dT}\frac{\partial U}{\partial f}/\lambda + p\frac{\partial X_m}{\partial T},$$

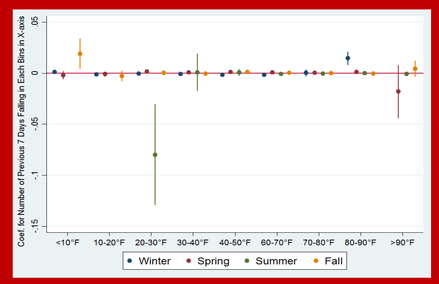
Empirical Specification

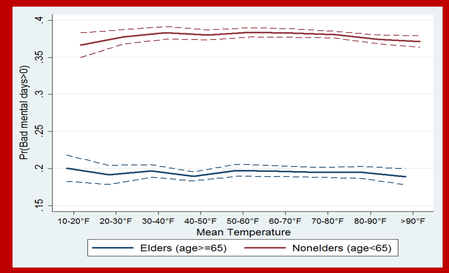
$$MH_{ijt} = G(f(temp_{jt}, \dots, temp_{jt-T}) + \sum_{k=0}^{T} W_{ji-k} + X_{ijt} + Y_t + v_{it} + \varepsilon_{ijt}).$$

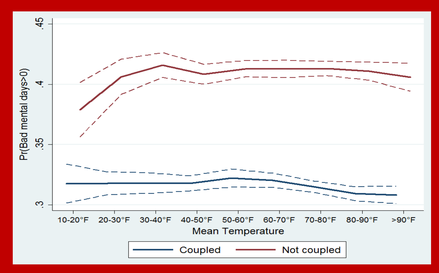
- MH_{ijt} takes value of 1 if the respondent reported at least 1 bad mental health days, and we apply the logit link for $G()$;
- For $f()$, we assigned mean temperature for the interview date as well as previous 7 to 30 days to each of the ten bins from less than 10°F to greater than 90°F by 10°F intervals;
- $temp_{jt-k}$ *and* W_{ji-k} controls for past k days temperature as well as precipitation, relative humidity, solar radiation;
- X_{ijt} includes individual's socio-economic and demographic information;
- Y_t and v_{jt} controls for fixed effects of month, day-of-week, federal holidays, state-year and county. Standard errors were clustered at the county level.

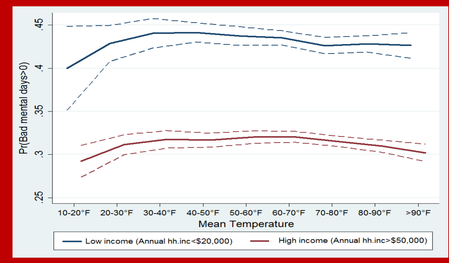












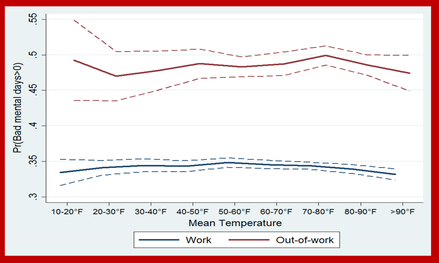


Figure 1. Heterogeneity Analysis

Conclusions

- The impact of temperature on the probability of having bad mental health is non-linear and shows an inverted U-shape.
- Seasonal difference is driven by the lower temperature in summer and higher temperature in winter.
- There is significant heterogeneity by age, marital status, income and employment among populations.