

In hot weather, outdoor laborers work less—when economy is growing

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A new analysis suggests that U.S. workers in industries that expose them to weather conditions work fewer hours per day when temperatures surpass 90 degrees Fahrenheit—but only during periods of economic

growth. Matthew Neidell of Columbia University, New York, and colleagues present these findings in the open-access journal *PLOS ONE* on August 25, 2021.

Earlier research conducted by Neidell and co-author Joshua Graff Zivin of the University of California, San Diego, revealed an association between [extreme heat](#) and fewer hours worked by people in weather-exposed conditions in the U.S. However, that analysis was conducted during a four-year period of economic growth, so it was unclear whether the same relationship would hold up over time or under different economic conditions.

To clarify, Neidell, Graff Zivin, and colleagues used historical weather records and data from the American Time Use Survey to analyze the relationship between time worked per day and daily temperatures for the period spanning 2003 through 2018. They focused on high-risk laborers, meaning workers in industries that expose them to weather conditions, such as agriculture, construction, and manufacturing.

The analysis showed that, when the U.S. economy was in a period of growth, such as from 2003 to 2007 and from 2015 to 2018, high-risk laborers worked fewer hours on high-heat days. Specifically, on days above 90 degrees, a high-risk laborer worked 2.6 minutes less on average for every degree above 90 than they worked on a 90-degree day.

However, during the Great Recession, from 2008 to 2014, there was no association between high-heat days and daily hours worked—perhaps, the authors suggest, because workers faced higher competition for employment and employers were less flexible.

The researchers also used climate and economic projections to predict the future effects of this relationship between heat and [work time](#). They estimated that, in a "business-as-usual" scenario where greenhouse-gas

emissions remain high, lost wages due to high-heat days could add up to \$80 billion per year by 2090.

Further research will be needed to confirm and clarify these findings and predictions, which could help inform policies and adaptations to address high-heat labor conditions.

The authors add: "Our findings support previous results that the amount of time people work is affected by temperature, but the magnitude of this relationship depends on where we are in the business cycle. During hard economic times, work time is less sensitive to temperature changes, suggesting the relative bargaining power of employers and employees seems to influence who bears the costs of extreme heat."

More information: Neidell M, Graff Zivin J, Sheahan M, Willwerth J, Fant C, Sarofim M, et al. (2021) Temperature and work: Time allocated to work under varying climate and labor market conditions. *PLoS ONE* 16(8): e0254224. doi.org/10.1371/journal.pone.0254224

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