

Study finds warmer temperatures improve women's performance

May 22 2019



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Turning up the thermostat at the office may result in higher productivity

for women, a new USC study finds.

The study found that women performed better on math and verbal tasks at [higher temperatures](#), while the opposite was true for men. As temperatures increased, so did women's performance on tasks. When temperatures were lowered, men performed better, although the relationship between [temperature](#) and men's performance was less pronounced.

The study suggests that gender is an important factor not only in determining the impact of temperature on comfort but also on productivity and cognitive performance. The study, authored by Tom Chang, associate professor of finance and [business economics](#) at the USC Marshall School of Business and Agne Kajackaite of WZB Berlin Social Science Center in Germany was published in the May 22 edition of *PLOS ONE*.

"It's been documented that women like warmer indoor temperatures than men—but the idea until now has been that it's a matter of personal preference," Chang said. "What we found is it's not just whether you feel comfortable or not, but that your performance on things that matter—in math and verbal dimensions, and how hard you try—is affected by temperature."

A total of 543 students participated in the laboratory experiment, which was conducted in Berlin. For each session, room temperatures were set at various increments ranging from about 61 degrees Fahrenheit to about 91 degrees Fahrenheit.

In each period, participants were required to complete three different tasks—monetarily incentivized based on performance—within a given amount of time. In the math test, participants were asked to add up five two-digit numbers without using a calculator. For the verbal task,

participants were asked to build as many German words as possible given a set of ten letters. In the last task, the cognitive reflection test, participants were given a set of questions framed so that the intuitive answer was the wrong answer.

The authors found a meaningful relationship between [room temperature](#) and how well participants scored on the math and verbal tasks, while temperature had no effect for men and women on the cognitive reflection test.

"One of the most surprising things we learned is this isn't about the extremes of temperature," Chang said. "It's not like we're getting to freezing or boiling hot. Even if you go from 60 to 75 degrees, which is a relatively normal temperature range, you still see a meaningful variation in performance."

The authors note that the increase in female cognitive performance at warmer temperatures appears to be driven largely by an increase in the number of submitted answers, which they interpreted as evidence that the increased performance is driven in part by an increase in effort. Similarly, the decrease in male cognitive performance was partially driven by a decrease in the number of submitted answers. The increase in female cognitive performance is larger and more precisely estimated than the decrease in male performance.

The authors say the results "raise the stakes for the battle of the thermostat," suggesting that it is not just about comfort, but also about [cognitive performance](#) and productivity. They say their findings suggest that in mixed gender workplaces, the temperatures should be set significantly higher than current standards to increase productivity.

"People invest a lot in making sure their workers are comfortable and highly productive," Chang said. "This study is saying even if you care

only about money, or the performance of your workers, you may want to crank up the temperature in your office buildings."

More information: Chang TY, Kajackaite A (2019) Battle for the thermostat: Gender and the effect of temperature on cognitive performance. *PLoS ONE* 14(5): e0216362. journals.plos.org/plosone/article?id=10.1371/journal.pone.0216362

Provided by University of Southern California

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