Smoking cessation strategies targeting stress reduction may be more successful in women

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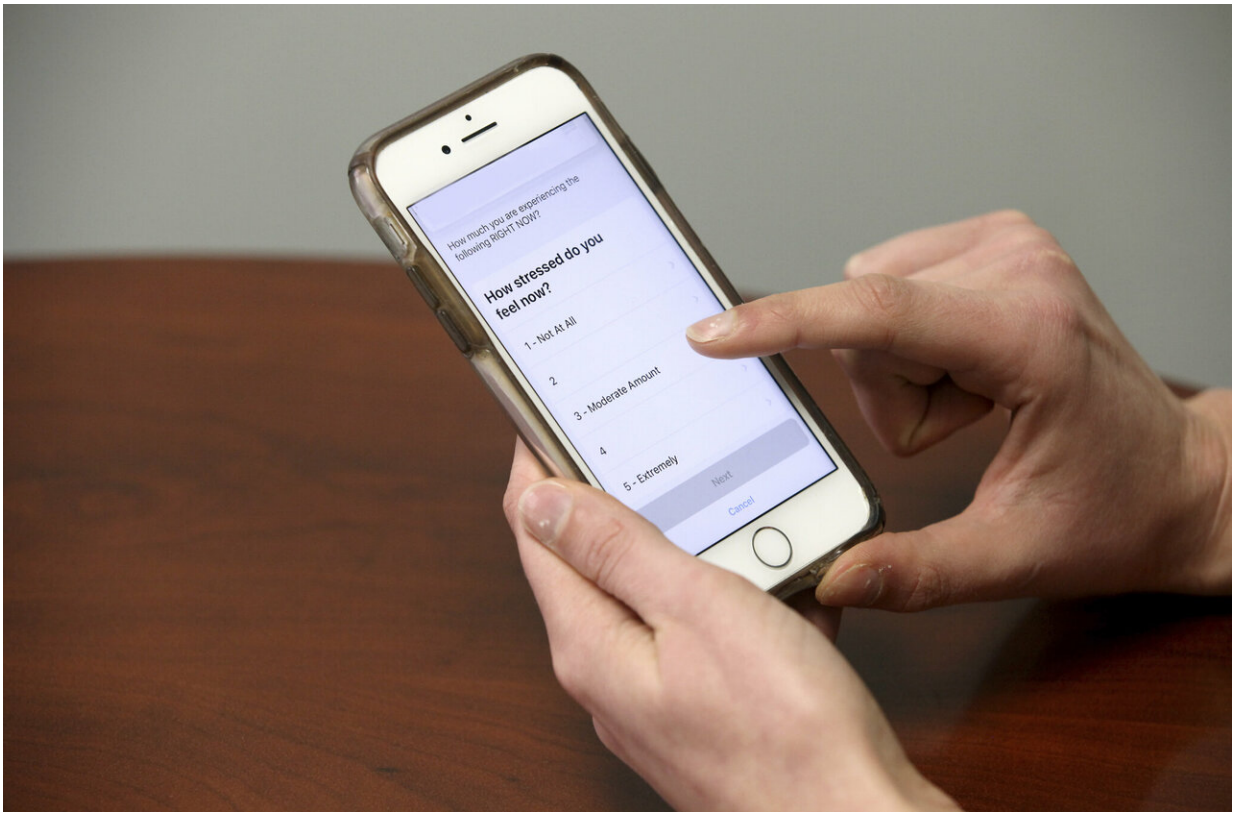

The status/post smartphone app (Infinite Arms, Charleston SC), which is integrated with the research tool RedCap, was used to collect data from smokers in this study. Credit: Sarah Pack, Medical University of South Carolina

Gender matters when it comes to smoking cessation.

Women are 31 percent less likely to quit smoking successfully, according to the National Institute of Drug Abuse, in part because nicotine replacement therapy is thought to be more effective in male smokers. In contrast, laboratory-based studies suggest that women crave cigarettes more when they experience stress. However, that finding has not been clearly replicated in a real-world setting.

In an article published online by *Nicotine & Tobacco Research*, researchers at the Medical University of South Carolina (MUSC) report the findings of a real-world study in 177 smokers. In the study, female smokers experienced more stress and craving than male smokers after viewing stress cues. Stress cues are images that induce stress, similar to news images of violence or war. However, no gender differences in craving were noted after viewing cellphone-delivered smoking cues. Smoking cues are images that suggest smoking behavior, such as a photograph of a cigarette or a person smoking.

These findings suggest that improving quit outcomes in women may require gender-specific cessation strategies.

"We know that not all existing treatments are equally effective for men and women," says Rachel L. Tomko, Ph.D., assistant professor in the Department of Psychiatry and Behavioral Sciences at MUSC and first author on the article. "That could be because they find different aspects of smoking rewarding and relieving, and there are different things that maintain their smoking. Our findings suggest that stress may be one thing that maintains smoking more for women than for men."

"This research helps us understand what drives smoking behavior and what really may create barriers to treatment that we didn't think were there," explains Kevin M. Gray, M.D., professor in the Department of Psychiatry and Behavioral Sciences at MUSC and senior author on the article. "If smoking were all about the nicotine, then everyone would

respond beautifully to nicotine replacement therapy. But it's more nuanced and complex than that. The better we can get at it, the better we will be able to create the right kinds of treatment for each individual."

Participants in the real-world study viewed eight images each day (four sets of two) for two weeks. These included smoking cues, stress cues and neutral images. Each time they received a pair of images, they completed a form assessing their stress, negative emotion and craving levels before viewing the images (their baseline value) and after viewing each image. They also tracked the number of cigarettes they smoked each day.

These data were recorded via a smartphone app (status/post; Infinite Arms; Charleston, SC) that integrates with the research tool RedCap (Vanderbilt University), and these RedCap data were hosted by the South Carolina Clinical and Translational Institute, an NIH Clinical and Translational Science Awards Program Hub.

As already noted, female smokers reported experiencing more stress, negative emotion and craving after viewing stress cues, but not smoking cues, than male smokers. Regardless of gender, smokers with higher baseline levels experienced more stress, negative emotion and craving after viewing stress cues. Because women smoke more in response to stress and environmental triggers, their smoking patterns could be expected to vary more than men's. However, the MUSC team found no difference in the number of cigarettes smoked per day for male and female smokers.

"Fortunately, showing smokers stress and smoking cues did not result in an overall increase in cigarettes smoked," says Tomko. "This is likely because smokers are already exposed to similar images on a daily basis. However, it is surprising that women did not have more day-to-day fluctuations in their number of cigarettes than men. It is possible that

minor, everyday stressors result in women smoking a cigarette a bit sooner than they would have otherwise but does not impact the overall rate of smoking. We hope to test this in future research."

With other colleagues at MUSC, Gray and Tomko plan to analyze the daily hormone level data collected during the study to explore how hormones affect stress and smoking. Using a special lighter that can record time, they will also conduct studies to see how long it takes for different smokers to light up after experiencing stress. This could, for example, provide more evidence that stress leads to smoking in women. More broadly, they will continue to map out the gender and other differences that affect how smokers respond to treatment and use that knowledge to better craft cessation therapies.

"The really good news—and we can say this both as clinicians and researchers—is that we have effective treatments for smoking cessation," says Gray. "The challenging news is that, even with effective treatments, most smokers who try still struggle to quit smoking. We can try to make improvements by using the blunt instrument of a bigger, better treatment for everybody. However, I think we should also try to think what is different between individuals—either gender or other characteristics—and whether those differences help us better tailor our treatments."

More information: Rachel L Tomko et al, Sex Differences in Subjective and Behavioral Responses to Stressful and Smoking Cues Presented in the Natural Environment of Smokers, *Nicotine & Tobacco Research* (2018). DOI: 10.1093/ntr/nty234

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