

Gender differences in PTSD risk may be due to heightened fear conditioning in women, study finds

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(Medical Xpress)—Women exposed to trauma may be at [greater risk](#) of developing post-traumatic stress disorder because of a heightened fear response, according to a new study.

UCSF researchers from the San Francisco Veterans Affairs Medical Center (SFVAMC) and SFVAMC-based Northern California Institute for Research and Education (NCIRE) examined individuals with PTSD symptoms and found that the [women](#) in the study were more likely than the men to develop a stronger [fear response](#), and – once conditioned to respond fearfully – more likely to have stronger responses to [fear](#)-inducing stimuli.

"Differences in the learning of fear may be one mechanism that may be important in the development of PTSD," said Sabra Inslicht, PhD, a UCSF assistant professor of psychiatry at the SFVAMC, and the lead author of a study published in the Oct. 26 online edition of the *Journal of [Psychiatric Research](#)*.

UCSF, which has been affiliated with the SFVAMC since the 1960s, is a leader in the scientific study and treatment of PTSD and traumatic brain injuries. Each year, UCSF and SFVAMC researchers are key participants in "The Brain at War" symposium, the leading national conference bringing together scientists, physicians, [military personnel](#) and administrative leaders to discuss the neurocognitive consequences of

combat.

Inslicht, who first presented some of the new findings at the 2012 symposium, studies how men and women learn and unlearn the fear response. Scientists call these processes "fear conditioning" and "fear extinction."

"The preliminary findings of our experiment suggest that women with PTSD had greater fear-conditioning responses than did men with PTSD," she said. "This suggests that there may be differences in how men and women learn to fear. That may be one reason that the rates of PTSD are higher in women compared to men," she said.

Greater fear conditioning in women might reflect a pre-existing vulnerability, or might arise in a sex-dependent way with the development of PTSD, Inslicht said.

The study included 18 men and 13 women who developed PTSD due to combat, sexual assault, physical assault or accidents. Participants were conditioned to expect to receive an electrical stimulus deemed to be "highly annoying but not painful" in association with particular images being flashed on a screen.

The researchers measured electrical conductance in skin to track moisture changes associated with the presentation of the images. These moisture changes reflect emotional responses, including fear.

[Fear conditioning](#) during trauma may create associations that later help trigger responses that are characteristic of PTSD, Inslicht said.

"It is believed that neutral environmental cues present at the time of trauma exposure become associated with fear and arousal such that these previously innocuous [stimuli](#) can trigger conditioned fear responses even

when danger no longer is present," she said.

Implications for Fear Extinction

Inslicht cautioned that the research is still in the early stages. "This study tells us about fear learning, but it's going to be really interesting is to see how people extinguish the fear response," a possible key to recovery in PTSD, Inslicht said.

Co-authors of the study included Thomas Neylan, MD, UCSF professor of psychiatry at the SFVAMC; and Charles R. Marmar, MD, a former UCSF faculty member who now is a New York University (NYU) professor of psychiatry.

Inslicht now is investigating pharmacological agents to see if they can enhance fear-extinction learning and retention in chronic PTSD. She is also examining the role of hormones that may be associated with sex differences in PTSD.

Levels of the stress hormone, cortisol, also appear to be associated with vulnerability to later stressful events, at least among police officers, Inslicht and Marmar discovered in a [December 2011 study](#) published in *Biological Psychiatry*.

Inslicht and Marmar also led an earlier study in which researchers measured cortisol in police officers when they first woke up in the morning and again 30 minutes later. In subsequent years, officers with higher cortisol were more likely to experience stress reactions to traumatic events, they found.

PTSD is a significant health issue among veterans returning from combat duty. Women still are not allowed to serve in combat units in the U.S. military. However, in practice women have been attached to

military battalions in recent years. These women may come under attack while serving as medics, mechanics and radio operators, or while performing other duties. The Pentagon only began formally allowing women to undertake these jobs on a permanent basis earlier this year.

More information: www.ncbi.nlm.nih.gov/pubmed/23107307

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