



Unlocking the Genomics of PTSD

The National Center for PTSD
Fiscal Year 2023 Annual Report



National Center for
PTSD
POSTTRAUMATIC STRESS DISORDER

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Acronyms Used in the Text

Acronym	Definition
bCBCT	Brief Cognitive-Behavioral Conjoint Therapy
BRIDGES	Building Re-Integration from Dreams and Goals to Execution and Success
CBT-I	Cognitive Behavioral Therapy for Insomnia
CPT	Cognitive Processing Therapy
DNA	Deoxyribonucleic Acid
DoD	Department of Defense
EBP	Evidence-Based Psychotherapy
EMDR	Eye Movement Desensitization and Reprocessing
FY	Fiscal Year
GWAS	Genome-wide Association Study
LGBTQ	Lesbian, Gay, Bisexual, Transgender, and Queer
LIGHT	Longitudinal Investigation of Gender, Health and Trauma
IPV	Intimate Partner Violence
MD	Medical Doctor
MDD	Major Depressive Disorder
MDMA	3,4-Methylenedioxymethamphetamine
MEG	Magnetoencephalography
NCPTSD	National Center for PTSD
NHRVS	National Health and Resilience in Veterans Study
NPBB	National PTSD Brain Bank
OMH	Office of Mental Health
PE	Prolonged Exposure
PhD	Doctor of Philosophy
RNA	Ribonucleic Acid
PCT	Present-Centered Therapy
PTSD	Posttraumatic Stress Disorder
PTSD Repository	PTSD Trials Standardized Database Repository
RCT	Randomized Controlled Trial

Acronym	Definition
SOTA	State-of-the-art
SPS	Single-Prolonged Stress
TBI	Traumatic Brain Injury
TRACTS	Translational Research Center for Traumatic Brain Injury and Stress Disorders
TrIGR	Trauma Informed Guilt Reduction
USUHS	Uniformed Services University of the Health Sciences
VA	Department of Veterans Affairs
VET	Veteran Engagement Team
VISN	Veterans Integrated Service Network
WET	Written Exposure Therapy
WoVeN	Women Veterans Network

From the Executive Director

When the National Center for PTSD opened its doors in 1989, posttraumatic stress disorder was often misunderstood, downplayed, and questioned. Today, almost 35 years later, we have come a long way—especially in how PTSD is treated. Then, we had no practice guidelines and very little research on treatment. While we have effective treatments now, we are continuing to investigate new options.

Genomics, the theme of this year's Annual Report, has the potential to play a tremendous role in how disorders like PTSD are prevented, diagnosed, and treated. Our opening story describes our research on the genomics of PTSD and where the findings are taking us.

Therapeutic use of psychedelics for PTSD is another exciting research topic at the National Center. Along with others from the National Center and in conjunction with the Office of Mental Health and the Office of Research and Development, I have been part of a team that put on a state-of-the-art (SOTA) meeting in September 2023 to evaluate the science of psychedelic medicine and how that can inform research, implementation, and policy. The SOTA meeting hosted researchers, administrators, clinicians, and policymakers in an effort to come together and be informed by the science and to responsibly promote scientific inquiry.



Paula P. Schnurr, PhD

One of the National Center's initial goals was to facilitate access to publications on trauma and PTSD. In 1990, we developed PILOTS, a bibliographic database of the world's literature on trauma and PTSD with 2,000 articles. In 1996, the Center's (then) new web page provided direct online access to the database, and as of 2023, PTSDpubs, as it is currently known, contained almost 70,000 articles. Recently, we developed another online database, the PTSD Repository, to provide more detailed information about the treatment of PTSD. In FY 2023, the Repository contained almost 500 articles and is growing every year.

Along with the rest of the country, NCPTSD recognized PTSD Awareness Month in June. This year, we partnered with 30 nonprofit organizations to promote PTSD Screening Day on June 27, encouraging people who were experiencing symptoms after a traumatic event to complete a confidential online screening. June brought more than 100,000 participants, engaging with the screening tool and going on to access other resources to learn about treatment options. In addition, more than 60,000 teams registered for our third annual PTSD Awareness Walk.

I am proud of the progress we continue to make, specifically at NCPTSD and as a nation. When NCPTSD was established, some people questioned the diagnosis of PTSD. Now there's greater awareness and better understanding. We've come from where we were in 1989 to widespread recognition among the medical community and the general population that PTSD is a serious condition that affects millions of Americans, but is treatable thanks in part to the research done at NCPTSD.

Paula P. Schnurr, PhD
Executive Director

Using Genomics to Understand PTSD

An individual's genome is their complete set of DNA. Virtually every cell in the human body contains a complete copy of the approximately 3 billion DNA base pairs that make up the genome. Each person's individual genome is what makes them unique—including their risk for developing disease. The genome can also contain the keys to developing treatments for diseases, guiding the development of new medications and therapies.

Throughout its history, the [National Center for PTSD](#) has been dedicated to improving treatment outcomes for those diagnosed with PTSD. NCPTSD's lifespan—the last 35 years—has coincided with rapidly increasing understanding of the human genome and its role in health and illness. NCPTSD investigators are studying the human genome to translate the biology of PTSD into better treatments and potentially uncover ways to help prevent the disorder.



The genome, the complete set of a person's DNA, is the individual blueprint that makes each person unique—including their risk for developing PTSD after exposure to trauma.

The genes in the genome provide the code for every protein in the body: the DNA is transcribed into RNA, which in turn is translated into specific proteins. The genes themselves do not change over time, but which genes are eventually translated into proteins can change based on environmental exposures (such as exposure to

stress and trauma). Genomics researchers at NCPTSD are using cutting-edge technology to study all aspects of how DNA creates proteins relevant to the development and experience of PTSD and the recovery from PTSD.

"The technology has dramatically improved so that our ability to study genomics has gone far from where it was 10 years ago, even five years ago," said Paul Holtzheimer, MD, Deputy Director for Research and Director of the VA PTSD Brain Bank. "That allows us to do much more with the genetic material and move much more quickly toward using that information to potentially guide treatment development."

"It is all part of an effort to better understand the biology of PTSD to put it to these multiple uses for treatment," said Paula Schnurr, PhD, Executive Director of the National Center.

A Genetic Springboard for New PTSD Treatments

When we think about developing new medications for PTSD, we need to think about what brain mechanisms we are specifically targeting, Holtzheimer says.

"There are several ways that genomics could help us develop better treatments," he said. "There are specific neurotransmitters that bind to certain receptors, and all of those biological elements—the neurotransmitters,

the receptors, the neurons—are created by genes. The genes provide the programming for all those elements. If you understand the difference in the genes and the genomics, like how those genes become those elements, then you might have an idea of differences that might become targets for treatment.”

We know what areas of the brain are involved in PTSD, says National Center researcher Doug Williamson, PhD. “[We look at] the frontal cortex, the amygdala, the hippocampus,” he said. “These are regions of the brain that are involved in what we call the fear circuit.” Williamson said they look at these parts of the brain because there is a lot of diversity in that fear circuit in a person’s initial response to the stress, how they remember circumstances around that stress, and then how they process it. A dysregulation of fear processing can become PTSD when people become “stuck” on a traumatic event they experienced.

Thanks to evolving technology and the development of very large datasets that include genetic information, research has been able to explore beyond brain regions and dive into the genomic underpinnings of PTSD. At NCPTSD, clinical psychologist and researcher Mark Miller, PhD, works with statistician Mark Logue, PhD, on a research team to advance their understanding of the genomics of PTSD and related comorbid conditions, most recently delving into research on the relationship between PTSD and dementia.

This group was one of the first groups to publish what is called a genome-wide association study (GWAS) of PTSD, looking across the complete sets of DNA of PTSD patients and controls to find genetic associations with disease. Since then, they have continued their work on genetics, looking at another aspect of genetics called epigenetics—how genes are expressed in response to environmental factors—and at blood, saliva, and imaging-based biomarkers of PTSD.



Survey responses from some Veterans participating in the NHRVS study were combined with genetic data to better understand how the genome impacts PTSD symptoms and other psychosocial factors.

Logue is studying genetic risk factors for PTSD. Not everybody who experiences a traumatic event develops PTSD, and not everybody who has the same level of traumatic exposure will develop PTSD. A person’s genetics may play a role. “Not all of it,” he said, “but about the same amount as other psychiatric disorders like depression. We’re looking at what you inherit that makes you more susceptible to developing PTSD, but we’re also looking at what’s happening to you now or as you go throughout your life, and you get PTSD or you’ve had it for a while.”

There is good evidence that several different psychiatric disorders are associated with people’s bodies and brains looking older than their actual years would suggest, according to Erika Wolf, PhD, clinical psychologist at NCPTSD. This is called accelerated cellular aging. Her research on this process helps to explain how psychiatric disorders, such as PTSD, can impact physical health in addition to mental health.

Another key line of work ties genomic markers of PTSD to detailed information about individuals’ longitudinal mental and physical health. The National Health and Resilience in Veterans Study (NHRVS) is a large-scale longitudinal study of U.S. Veterans. A subset of the Veterans who participated in NHRVS also provided genetic information via saliva samples, and their genetic markers were anonymously linked to their

psychological battery data. This information has revealed unique genetic signatures of PTSD patients related to PTSD symptoms, cognitive patterns, and social attachment.



One day, information in a person's genome may help them decide whether to begin talk therapy or medication for PTSD.

This research aimed at understanding genetic markers of PTSD, how experiences can impact what genes are expressed, and how the genomic profile of psychiatric disorders like PTSD can influence the body, all can help to identify targets for developing and testing new PTSD treatments.

In addition to developing novel PTSD treatments through genetic discovery, says Holtzheimer, “we may be able to get information from the particular genome that says, ‘You look like you’ll be a great responder to [Prolonged Exposure](#) for PTSD,’ or, ‘You look like you’ll be a great responder to [sertraline](#) for PTSD.’”

Understanding the underlying genetic factors can also help to predict who is at heightened risk for developing a particular disorder. Over the last 10 years, there has been a significant increase in research across many neuropsychiatric disorders to look for risk variants—basically, parts of DNA that predispose or protect people from developing psychiatric disorders.

“We now have a large enough number of these studies looking at PTSD that we have good

hints about how an individual's specific genes might put them at risk for PTSD,” says Matt Girgenti, PhD, a neuroscientist at NCPTSD. “We also know that there are many different brain regions involved in PTSD, so it's important to know what the genes are doing in each of those brain regions. Without having the brains of people with PTSD, we are never going to be able to interpret what those areas of the DNA are doing.”

VA National PTSD Brain Bank

The VA National PTSD Brain Bank (NPBB) is a biorepository that was developed to source and store brains of people who lived with PTSD. Established in 2014, NPBB is a critical resource for NCPTSD investigators and the field.

In 1999, Matt Friedman, MD, PhD, founder of NPBB and former Executive Director of NCPTSD, and Robert Ursano, MD, (then) Chair of Psychiatry at the Uniformed Services University of the Health Sciences (USUHS), realized that none of about 100 brain banks around the globe were dedicated to PTSD. So, Friedman and Ursano decided to start one.

NPBB fills a unique scientific gap and allows scientists to ask questions that could not be answered any other way. “We had gone nearly as far as we could go in terms of trying to understand the brain mechanisms associated with PTSD,” Friedman said. “There had been wonderful advances in brain imaging. We could look at neurotransmitter receptors using brain imaging. We could look at cerebral blood flow in specific brain regions. We could look at different systems in the brain, and we had animal models where we could actually look at the animal brains using models that simulate PTSD in humans. But in order to clinch the deal, we really needed to look at human brain tissue to understand which genes were which, where they were being expressed within the brain, and whether there were genetic differences in terms of the DNA or differences in gene expression in terms of the RNA [in people with PTSD].”

The Brain Bank – How It Works

NPBB's central hub at VA Boston Healthcare System is its primary receiving and storage site for brain tissue specimens. All other NPBB locations—White River Junction, Durham, Miami, USUHS—also provide brain tissue to the Boston hub. NPBB is made up of two divisions, Operations and Intramural Research. Operations involves where and how the brains and tissue are stored. But it is the Intramural Research division that makes NPBB so unique: while all brain banks collect and store tissue, Intramural Research does its own research and data collection, as well as clinical assessment.

Antemortem vs. postmortem donations

NPBB arranges to have brains donated antemortem (before death) by some individuals, and other brains are acquired postmortem (after death). There is a big difference, in that NPBB knows a lot more clinically about the individual with the antemortem brain, as it has information provided by the donor directly, possibly over years of their lifetime. For brains collected postmortem, NPBB must rely on medical records and interviewing next of kin.

“If you're doing an animal study, you know exactly what you did to that animal,” said Russ Huber, MD, site director for the Boston site and Deputy Director of Operations for NPBB. “With human brains and tissue, that's not always the case. We have one of the most in-depth clinical assessments that you're going to find, and that allows us to understand what has happened to the tissue, look at covariates—things that might be affecting your study.”

Interested in making a donation?

Potential brain donors may [contact NPBB through its website](#) or by calling 800-762-6609. They will be given more information about NPBB and asked to review and sign a consent form, and if enrolled, interviewed about their demographic characteristics, trauma history, mental health history, and functional status. All such information is confidential. NPBB can enroll both non-Veterans and Veterans as potential donors.

Huber said that is really what the NPBB hub is all about—detailed clinical assessments, so the tissue is well characterized, and then also neuropathologically characterized. “It's a very detailed process and requires a lot of people who really know what they're doing to make sure that when people gift us with their brain tissue that we're able to use that to the greatest scientific benefit possible,” he said.

Recruiting for the antemortem program

Recruiting is critical to NPBB's mission, both within and outside VA. NPBB is the only VA-based brain bank allowed to take tissue from non-Veterans, and collaborates with organizations like [PINK Concussions](#), a nonprofit organization that focuses on pre-injury education and post-injury medical care for women and girls with brain injury, including concussion incurred from sport, domestic violence, accidents, or military service.

NPBB collects tissue from people with PTSD, people with depression (the most common co-occurring disorder; people with both PTSD and major depressive disorder [MDD] can donate their brains), and healthy controls who had no history of psychiatric or neurological disorder. By comparing the PTSD and depression groups with healthy controls, NPBB investigators can learn about the unique differences in gene expression that are related specifically to PTSD.

Traumatic Stress Brain Research Group

One unique strength of NPBB is the Traumatic Stress Brain Research Group, an intramural research group (including many NCPTSD researchers) working in-house with available NPBB brain tissue to generate high-quality molecular data. The idea was to generate large deidentified datasets that could then be shared

with the scientific community. Investigators studying gene expression outside of NCPTSD are welcome to work with NPBB on their own projects.

“We have experts at Duke, at Durham, at West Haven, at Boston, at White River Junction—across all the major sites of the NCPTSD and the Brain Bank—who understand different aspects of the genomic variations we’re interested in,” Girgenti said.

NPBB also streamlines the development of additional ideas and on secondary analyses that could be done on that data more quickly. (See the [FY 2022 Annual Report](#) for more on how NCPTSD research, including NPBB, contributes to “big data” efforts to better



Matt Friedman, MD, PhD, former Executive Director of NCPTSD, co-founded the National PTSD Brain Bank.

understand and treat PTSD.)

Recent work from the intramural research group of NPBB includes the discovery of sex differences in how genes are transcribed in men and women with PTSD. This work, led by Girgenti, may begin to explain the higher rates of PTSD

in women than men. Other work led by Janitza Montalvo-Ortiz, PhD, looks at the epigenetics of PTSD, probing which genes are activated in individuals with PTSD versus healthy controls. The research of both Montalvo-Ortiz and Girgenti is beginning to unpack the risk factors across demographic or clinically relevant groups, such as sex, race, and ethnicity, and comorbidities such as MDD or substance use disorders.

Future work might also look at specific types of brain cells, and how the genome may differentially impact different types of brain cells. Certain cells in the brain, Girgenti says,

may be mechanistically relevant to having PTSD. “We won’t know that from just looking at gross anatomical dissections and doing molecular biology on it,” he said. “We need to look at individual cell types to see how they’re specifically changing.”

Are you a researcher interested in working with NPBB tissue?

Visit the [NPBB website](#) for information about how to collaborate with NPBB or access tissue for pilot or larger-scale projects.

Modeling PTSD in Non-Human Animals

Animal models are another way to extend the discoveries made through NPBB and allow another level of scientific inquiry into the genetic underpinnings of PTSD. Genes that are identified through postmortem brain genomics are manipulated in a living animal. This can be done through a variety of different mechanisms, “but it’s really easy to just go into an animal and make these genes go up, make these genes go down, depending on what we see in the postmortem brain, and then see how that affects their behavior,” Girgenti said.

NPBB investigators recently reported genome-wide evidence for more than 500 differentially expressed PTSD genes, many of them novel for PTSD. The functions of most of these genes are unknown, so a crucial next step is to explore their impact on neuronal function using a model organism. “We can stress these animals, give them a type of trauma,” says Girgenti, “and then use the drugs that we’ve identified [through genomic research] to see if we can reverse the behaviors that are caused by the trauma and the behavior that we have.”

For example, the single-prolonged stress (SPS) model is a well-tested mouse model of PTSD in which the mouse is exposed to a single,



Animal models can help answer questions about human behavior and psychiatric diseases that cannot be studied in humans.

prolonged episode consisting of three stressors. In work led by Alicia Che, PhD, a subset of mice show elevated anxiety-like behaviors following SPS, mimicking a core symptom of PTSD, while others are resilient and do not show high anxiety. This model effectively captures mice differentially responding to traumatic events, just as humans have a range of responses to trauma. Recent NPBB-led findings show that mice that are susceptible to SPS have a different genetic and neurobiological profile than mice who are not susceptible to SPS, including differences in synaptic transmission and in genes like *GRM7* and *ELFN1* that control inhibitory neurons. Current work uses *in vivo* methods to investigate how these alterations lead to changes in neural activity and ultimately lead to dysregulated brain function in PTSD.

Other animal model work, led by NPBB investigator Ellen Hoffman, MD, PhD, uses the zebrafish. While the zebrafish has limitations in modeling a human psychiatric disorder like PTSD, emerging evidence suggests that it is a useful model to study the functions of genes that contribute to PTSD risk. NPBB investigators have screened three high-risk PTSD genes, including *SGK1*, *TSPO*, and *CRHR1* genes and a mutant

behavioral screen for the *ELFN1* gene. Mutants for *ELFN1* and *CRHR1* appear to have distinct behavioral “fingerprints” including disruptions in startle response and sleep behaviors—both symptoms of human PTSD. In pursuit of possible novel therapeutics for PTSD, this work is currently being extended by exploring the intersection of the identified mutant behaviors with a custom zebrafish drug database, to identify possible therapeutics that anti-correlate or reverse these PTSD-like behaviors.

Looking Ahead

Genome- and epigenome-wide association studies give us clues as to which genes are involved in PTSD by showing which genes are present, or activated, in individuals with PTSD as compared with healthy controls. Other work at NCPTSD ties genetic information to specific behaviors, symptoms, and diagnoses related to PTSD. The work of NPBB fills a crucial gap in NCPTSD’s bedside-to-bench-to-bedside continuum of innovation. It allows us to understand how a person’s genome drives their response to trauma and potential response to treatment. From there, animal models allow the field to test novel therapeutics in models of human PTSD.

“A lot of our work, and the work of people across the country in PTSD and in other disorders,” Schnurr said, “is trying to find ways to enhance treatment outcomes, either to take treatments that we have and make them better or to identify new treatments. Genomics research gives us the opportunity to look at the entire genome to suggest novel strategies that might be promising for treatment development.”

Major Research Initiatives in 2023

NCPTSD investigators study PTSD across the full scientific spectrum, from genomics to implementation of effective treatments, and are guided by five [operational priorities](#): Biomarkers, Treatment, Care Delivery, Implementation, and PTSD and Suicide. During FY 2023, NCPTSD researchers led 144 funded studies, including research undertaken in collaboration with partner organizations in the government, academic institutions, and international agencies. Investigators published 315 peer-reviewed journal articles, book chapters, and books (see appendices C–G for a full list of grants, publications, and scientific presentations in FY 2023).

Biomarkers

Within the Biomarkers Operational Priority, research is focused on understanding the biological basis of PTSD to better predict who develops PTSD and to enhance treatment development. This includes genomics research as well as neuroimaging and other biological assessments.

This year's Annual Report describes how much of the Center's genomics work is supported by the National PTSD Brain Bank. As of FY 2023, the Brain Bank had over 350 frozen hemispheres in its inventory, and more than 230 people were enrolled in its antemortem donor program. The Brain Bank's research efforts produced 22 peer-reviewed publications, many in high-profile journals, and there were nine extramural projects utilizing Brain Bank tissue. This work identified several PTSD-relevant genes whose expression could be modified by environmental factors (e.g., trauma exposure). These genes may prove to be important for understanding who develops PTSD, which treatments work better for which individuals, and who is at greater risk for suicide. Other work used data from the VA's Million Veteran Program to assess genetic markers that were associated with dementia and early cognitive decline in people with PTSD.



Using a variety of neuroimaging methods, Center investigators assessed biological subtypes of PTSD, specifically looking at neural networks involved in attention, arousal, and emotion regulation. Much of this work was conducted in collaboration with the [Translational Research Center for Traumatic Brain Injury and Stress Disorders \(TRACTS\)](#). Other research used magnetoencephalography (MEG) to assess brain function involved in emotion regulation. MEG is unique in having extremely high spatial and temporal resolution, allowing investigators to study brain activity more precisely than with other methods, such as magnetic resonance imaging or positron emission tomography. Two other complementary studies continued to look at the ability of electroencephalography and functional magnetic resonance imaging to predict which Veterans with depression, many of whom also have PTSD, are more likely to get benefit from transcranial magnetic stimulation, a noninvasive brain stimulation treatment.

Across the Center, work focused on the behavioral and biological consequences of traumatic brain injury (TBI), a common comorbid condition in Veterans with PTSD. This included animal studies assessing a variety of behaviors (such as fear learning, anxiety, and impulsivity) as well as potential interventions to address abnormalities (such as focal brain stimulation). Other research looked at how TBI contributed to symptoms, function, and health outcomes in Veterans, with a specific focus on biomarkers associated with inflammation. Additional research was focused on how certain hormones in women contribute to PTSD and its negative effects, including research on whether these hormones are associated with higher levels of perinatal complications in women with PTSD and other mental health disorders.

Treatment Efficiency, Effectiveness, and Engagement

Several lines of work at the Center focused on the real-world effectiveness of PTSD treatments. A retrospective, observational study of 1,130 Veterans engaged in VA residential treatment programs from FY 2018 to FY 2020 found strong efficacy for Prolonged Exposure (PE) and Cognitive Processing Therapy (CPT) with no significant difference between the two treatments. Recruitment continued for CSP #2016, a multi-site placebo-controlled trial comparing effectiveness of commonly prescribed medications for insomnia: trazodone and eszopiclone. Another multi-site study examined the comparative effectiveness of trauma-focused versus non-trauma-focused therapy for the treatment of Veterans with PTSD and substance use disorders.

The Center is engaged in multiple studies aimed at increasing the effectiveness and efficiency of effective treatments for PTSD. A prior study had found that Written Exposure Therapy (WET), a five-session exposure-based treatment for PTSD, was non-inferior to CPT in military service members. In FY 2023, a new study found that



WET was non-inferior to CPT in Veterans. An ongoing study is comparing WET to a support intervention in pregnant individuals with PTSD and looking at the comparative effectiveness of WET delivered by community health workers versus mental health clinicians. Efforts continued on a study of massed CPT for PTSD—a version of CPT delivered over several days instead of several weeks. Another study found Skills Training in Affective and Interpersonal Regulation (STAIR) to be more effective than Present-Centered Therapy (PCT) in reducing PTSD in women Veterans with military sexual trauma. Two studies are assessing the effectiveness of Trauma Informed Guilt Reduction (TrIGR), a six-session protocol to reduce guilt and shame related to a traumatic event, compared with PE and CPT, respectively.

Other work at the Center is aimed at enhancing existing treatments for PTSD using medications. Ketamine is an anesthetic with established efficacy for treating depression but uncertain efficacy when administered alone for treating PTSD. One study is testing whether ketamine can enhance the efficacy of PE for PTSD. Another study is assessing the benefits of oxytocin combined with Brief Cognitive-Behavioral Conjoint Therapy (bCBCT) for PTSD. Preparatory work was conducted for studies combining 3,4-Methylenedioxymethamphetamine (MDMA) with various psychotherapies including massed bCBCT and massed PE. Another study will compare MDMA-assisted psychotherapy with CPT.

Digital technologies, including telehealth, mobile apps, text messaging, and websites, can increase the engagement of effective treatment and supportive care for PTSD and commonly comorbid conditions. An ongoing study is testing an asynchronous text messaging version of CPT for PTSD compared with standard text messaging therapy. Several trials are assessing the effectiveness of mobile apps, including PTSD Coach and Mindfulness Coach. Other studies are focused on whether additional supports can improve the benefits of digital technologies, including a study of an online skills training intervention (WebSTAIR) showing that peer support improved efficacy for PTSD, depression, and psychosocial functioning.

Novel treatment development is another focus for the Center. Investigators are testing the safety and efficacy of glecaprevir and pibrentasvir, a medication combination typically used to treat hepatitis C, in Veterans with PTSD. This intervention was identified based on a retrospective review of VA electronic medical record data, published in FY 2023, showing its use to be associated with improvements in PTSD symptoms.

Care Delivery, Models of Care, and System Factors

The Center continues to engage in research to ensure that Veterans with PTSD nationwide receive access to VA mental health care. An ongoing VA-funded study aims to understand which Veterans who screen positive for PTSD in VA primary care clinics do not access follow-up VA mental health care, and which patient-, provider-, and system-level factors may impede access. Additional efforts include improving access to treatment for Veterans with opioid and alcohol use disorder and other co-occurring psychiatric disorders (e.g., PTSD). Analyses highlight key gender and racial disparities regarding treatment utilization

and health outcomes (e.g., opioid overdose), but also positive effects of receiving treatment via telehealth.



Work is also focused on understanding the needs of gender, racial, ethnic, and other subgroups of people with PTSD. The Center's Longitudinal Investigation of Gender, Health and Trauma (LIGHT) study, which over-samples women, individuals in high-crime communities, and racial and ethnic minority Veterans, assesses the impact of community and gun violence on trajectories of mental health and in health care utilization. Findings in FY 2023 showed how trauma history, military sexual trauma, community factors, discrimination, and COVID-19 impacted mental health symptoms and the increased risk of adverse perinatal outcomes for non-Hispanic Black Veteran women. An ongoing collaborative effort across the Center and with outside partners is examining the effects of trauma and other high-impact stressors on PTSD and related sequelae such as substance use disorders among lesbian, gay, bisexual, transgender, and queer (LGBTQ) Veterans. Findings to date show interactions between criterion A and non-criterion A trauma among transgender and gender-diverse individuals, as well as preferred interventions to address overlapping stressors and resulting symptoms.

The Modeling to Learn initiative trains staff in participatory systems dynamics modeling, a collaborative quality improvement approach in which stakeholders identify specific system problems and use simulation modeling to compare the likely outcomes of different potential solutions, and then select an optimal solution to implement. Two ongoing trials are testing whether Modeling to Learn is superior to more traditional approaches in increasing the number of Veterans who start evidence-based PTSD treatment.

Implementation

Facilitating implementation of best practices in PTSD care and studying barriers and facilitators of implementation are a major focus for the Center. An ongoing implementation study is examining real world treatment outcomes among Veterans treated by VA mental health providers who are trained to deliver WET, with early findings indicating that VA clinicians can effectively deliver WET and that outcomes are similar whether WET is delivered face-to-face or via telehealth.

Center investigators completed an evaluation of a national rollout of intimate partner violence (IPV) screening programs within women's health primary care clinics to determine implementation outcomes and clinical effectiveness. Results showed that an operations-funded external facilitator working for six months with a facility-funded internal facilitator nearly tripled the reach of IPV screening programs. This implementation facilitation strategy was associated with a two-fold increase in IPV detection rates and increases in patients' post-screening uptake of psychosocial services.



PTSD and Suicide

Research under the PTSD and Suicide Operational Priority aims to investigate the relationship between PTSD and suicide and develop strategies to predict and prevent suicide among individuals with PTSD. Several longitudinal datasets are being used to identify potential risk for and protective factors against suicidal thoughts and behaviors. Insomnia is being specifically targeted as a risk factor using an in-home sleep monitoring system. Other research identified a decision rule that may better identify which patients presenting with suicidal ideation will most likely benefit from hospitalization. Another key line of work focuses on developing and implementing an effective suicide prevention intervention to decrease suicide risk in Veterans living in rural settings.

Promoting PTSD Education: Training, Dissemination, and Communication

The National Center for PTSD’s educational mission is to improve PTSD outcomes by developing and disseminating authoritative, culturally competent, equity-informed programs and information on PTSD and related conditions, synthesized from published scientific research and collective clinical experience.

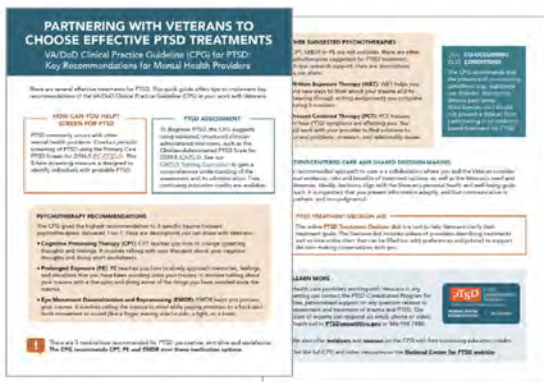
PTSD Awareness and Public Education

Millions of people turn to the NCPTSD website every year to find authoritative information on PTSD—from Veterans who want to understand the disorder’s symptoms, to family members wondering how to best support their loved ones, and to clinicians searching for treatment guidelines or continuing education courses. Given the pace of research on PTSD, it is important for us to continually update and expand the content we provide to website visitors. To that end, in FY 2023 we updated key, highly accessed pages for professionals, including those focused on [traumatic brain injury and PTSD](#), [epidemiology](#), [PTSD and the family](#), [chronic pain](#), and [trauma reminders](#). We also debuted a new article on [end-of-life issues among people with PTSD](#). Following the release of the 2023 VA/DoD Clinical Practice Guideline for PTSD, we revised pages that referenced treatments and created provider

handouts on [guideline-concordant prescribing](#) and [partnering with Veterans on treatment choices](#). We continued a project begun in FY 2022 to review and revise articles for the public to make sure they use inclusive language. While original content did not contain anything that was egregious, we did uncover some subtly biased or stigmatizing wording that we have since eliminated.

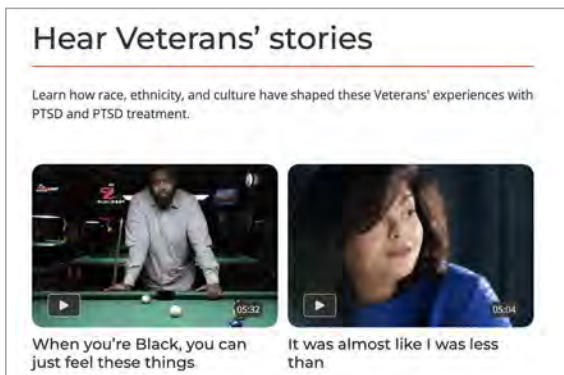
The NCPTSD website hosts an extensive section on [PTSD awareness](#) year-round, but it is in June—PTSD Awareness Month—when the subject is especially vital. This year, NCPTSD partnered with 30 nonprofit organizations, including the National Alliance on Mental Illness, the International Society for Traumatic Stress Studies, and Mental Health America, to promote PTSD Screening Day, encouraging people who were experiencing symptoms after a traumatic event to complete a [confidential online screening](#). More than 100,000 people visited the page in June, engaging with the screening tool and going on to access other resources to learn about treatment options. Offline, more than 60,000 teams registered for our third annual PTSD Awareness Walk. Our message that PTSD treatment works was amplified across social media and public service announcements on radio and television, reaching millions of Americans.

Another key resource in our efforts to spread the word about the effectiveness of PTSD



The VA/DoD Clinical Practice Guideline for PTSD was updated in 2023. NCPTSD led efforts to disseminate the updated guideline to providers within and outside VA.

treatment is the web-based [AboutFace](#) educational awareness campaign. This year, following robust user testing, we completed an update to AboutFace. Visitors can roam freely through the hundreds of videos from Veterans, family members, and providers, or navigate the site via a unified story about PTSD built around Veterans' experiences. This year also saw the release on AboutFace of a [feature on race, culture, and PTSD](#). A feature on moral injury is currently in development.



The AboutFace web page underwent a revision and reorganization in FY 2023 to include content on race, culture, and PTSD, and enhance the experience of visitors to the site.

A second and final season of the podcast, [Talking Later: Veterans' Stories of Late-Life PTSD](#), which focuses on recovery, resilience, and meaning making in older Veterans with PTSD, was released this year. The National Center's other podcast series, [PTSD Bytes](#), continues. *PTSD Bytes* offers "bite-sized" discussions of tools and resources at the intersection of technology and PTSD. Each episode of *PTSD Bytes* averages 15,000 listeners and 15,000 viewers of its associated blog. Both series are available for free on popular streaming and podcast platforms.

One of NCPTSD's most popular online products—the PTSD Treatment Decision Aid—is undergoing a complete revision. The PTSD Treatment Decision Aid is a tool that people can use to explore the various options for PTSD treatment and make values-based choices to discover the one that is right

for them. The revised tool will incorporate recommendations from the 2023 VA/DoD Clinical Practice Guideline for PTSD. In terms of design, the new PTSD Treatment Decision Aid will be completely responsive, so that users on any digital device, from phones to laptops, will have a seamless experience. Design enhancements will give the tool a more contemporary feel, with updated videos, a new flow, and more integration of content from other NCPTSD assets such as AboutFace.

Support for Providers in the Field

NCPTSD works with providers to improve the quality and accessibility of care that Veterans receive. Whether we are helping VA providers implement measurement-based care or training community providers in assessment, the goal is always to advance the clinical care of Veterans.

In recognition of the full scope of its mission, this year the PTSD Mentoring Program was renamed the PTSD Mentoring and Implementation Program. As ever, the program pursued its mission to promote clinical and administrative best practices in specialty care on multiple fronts. From FY 2020 to FY 2023, the reach of Cognitive Processing Therapy and Prolonged Exposure has steadily increased within PTSD specialty care settings, thanks in part to the program's collaboration with VA



The PTSD Mentoring and Implementation Program promotes clinical and administrative best practices in PTSD specialty care. Use of CPT and PE has steadily increased since FY 2020, in part due to the program's collaboration with PTSD Clinical Teams.

sites across the country. Building on efforts first piloted in FY 2022, the program added data on Written Exposure Therapy (WET) and Eye Movement Desensitization and Reprocessing (EMDR) to the PTSD Dashboard. With support from the Office of Mental Health (OMH), this effort will be expanded in FY 2024 so that all sites can accurately capture the breadth of evidence-based psychotherapies (EBPs) that they provide to Veterans with PTSD.

For the first time since 2019, the program held an in-person meeting of Veterans Integrated Service Network (VISN) PTSD mentors. This session allowed for an extensive review of program and policy updates and talks on changes to the VA/DoD Clinical Practice Guideline, measurement-based care, and other initiatives across the continuum of care. VISNs were also supported by the PTSD Mentoring and Implementation Program to hold their own in-person meetings. Attendees at the 16 in-person meetings and one virtual VISN meeting overwhelmingly reported that the sessions facilitated connections with their peers and agreed that they would be able to apply in their clinics the information they learned by attending.

While the Mentoring and Implementation Program focuses on policy and practice within VA, the [PTSD Consultation Program](#) offers direct support to providers who treat Veterans with PTSD. Professionals in the community and within VA can contact the PTSD Consultation Program to get expert advice about any topic related to care of Veterans with PTSD. In FY 2023, the program responded to more than 2,700 requests, over half of which were from non-VA providers. To further support community providers, the program collaborated with VA's Suicide Risk Management Consultation Program and the Center for Deployment Psychology to conduct in-person training typically unavailable to community providers. Expert clinicians held three two-day trainings that covered military culture and the assessment of PTSD and



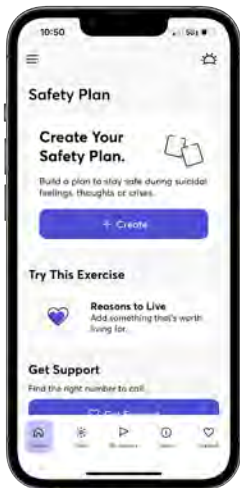
suicide risk. Nearly 200 community providers participated in the trainings and received free continuing education credits. The training was free to participants. The Consultation Program also continued its longstanding [lecture series](#). Each month, an average of 500 viewers tune in to the lectures to watch expert practitioners and researchers discuss important topics in PTSD assessment and treatment. This year's offerings included three talks on the 2023 VA/DoD Clinical Practice Guideline for PTSD, presentations on lethal means safety counseling, and culturally informed PTSD treatment for Native American Veterans. All lectures are archived and made available for future viewing on learning management platforms accessible to VA and community providers.

The [Tech into Care](#) initiative also serves VA and community clinicians, but its focus is on facilitating the integration of technology into mental health care. Within VA, NCPTSD has trained over 1,300 VA staff trained to incorporate mental health apps into their work with Veterans. Tech into Care completed a second pilot of Tech into Care+, which includes a self-guided internet-based tool for supporting implementation of apps into VA care. In addition to growing the cadre of VA providers who are well versed in mental health technology integration at facilities across the United States, Tech into Care+ continues to refine its content and processes.

The goal is to build a sustainable model that will be available to interested VA staff in the future. Tech into Care is also actively disseminating and facilitating the implementation of NCPTSD apps into care by developing support materials and maintaining active engagement with the field. This includes its monthly lecture series—open to community and VA providers—as well as VA-specific community of practice calls and the monthly *PTSD Bytes* podcast. In FY 2023, the Tech into Care team also published methodological recommendations based on these initiatives.

Self-Help and Treatment Companion Resources

NCPTSD continued to lead the field in releasing free, public mobile apps to support mental health and self-care. We completed the



The newly released Safety Plan app helps individuals stay safe and access support during times of crisis.

development of the Safety Plan app, which helps any Veteran, including those with PTSD, stay safe during times of crisis, try coping strategies, and access crisis support resources like the Veterans Crisis Line. Collaboration with OMH's Suicide Prevention Program was crucial in this effort, ensuring that the app aligns with broader efforts to implement suicide safety planning for all Veterans who are at risk of suicide. Major updates for PTSD Coach were released, with new content

on opioid safety, additional coping tools, and self-assessment features for tracking progress toward PTSD recovery goals. CBT-I Coach, for insomnia, was overhauled, with an improved user interface and features that had been requested by Veterans and providers, including integration with Google Fit and Apple Health, and additional tools and exercises. Other new

and redesigned apps currently in development include Concussion Coach 2.0; Mood Coach for PTSD-related mood disturbance; Strength at Home for prevention of intimate partner violence among Veterans, civilians, and couples; and Well Within Coach for women Veterans with PTSD. Overall, NCPTSD apps saw more than a half million downloads in FY 2023.

Excessive drinking is something that many people with PTSD—especially Veterans—struggle with. The free online program VetChange was developed by NCPTSD researchers and clinicians to help people with PTSD cut down on or stop their drinking. The VetChange app has proven popular with users. The National Center is now working to make a desktop version of VetChange, that combines self-help modules and provider assistance, available on a VA server.

The Women Veterans Network (WoVeN), a project conducted in partnership with Boston University that provides community and connection for women who have served in the U.S. Armed Forces, is now 4,500 women strong. With chapters in every state, WoVeN offers women Veterans of all ages and backgrounds the opportunity to connect with peers in person and online. Program evaluation data suggest that women who participate in WoVeN groups experience significant improvement in outcomes such as improved belongingness and quality of life. What's more, women in WoVeN who meet clinical cutoff criteria for PTSD and/or depression also show significant improvement in those mental health problems. WoVeN in VA, an adaptation being implemented across the VA health care system in collaboration with Women's Mental Health and Peer Support Services, continues to grow and is available in 15 VISNs. BRIDGES (Building Re-Integration from Dreams and Goals to Execution and Success), a pilot project that connects transitioning service members to Veterans, is in the process of winding down. Program staff are working to apply the lessons learned in BRIDGES to

the ongoing work of WoVeN. The goal is to seamlessly connect military women to Veterans, helping to ease their transition to civilian life.

PTSD Repository

[The PTSD Trials Standardized Database Repository \(PTSD Repository\)](#) continues to evolve and expand. Publicly available and free to use, the PTSD Repository helps researchers, clinicians, Veterans, and family members better understand the treatment literature by providing access to abstracted data elements from randomized controlled trials (RCTs) of PTSD treatment. There are now nearly 500 trials included in the PTSD Repository, a 56% increase from when it debuted in 2020. New this year are study quality ratings for all RCTs using [Cochrane's Risk of Bias 2 rating system](#). The data are also now included in [Metapsy](#), a database that provides open access to meta-analyses of a wide range of mental health disorders.

PTSDpubs

[PTSDpubs](#) is NCPTSD's online index to the world's literature on traumatic stress. It provides access to scholarly work not only in

the fields of psychology and psychiatry, but any discipline that addresses trauma and its aftermath. In FY 2023, we added 2,500 new citations to PTSDpubs, bringing the total number of database records to just under 70,000. Staff educated new PTSDpubs users through a national online training offered by the [VA Library Network](#) and will continue to make educational presentations to internal customers across VA. PTSDpubs staff are in the process of revising the database's thesaurus, a key tool for precise searching. The new thesaurus will be released in FY 2024.

Veteran Engagement Team

In FY 2023, the National Center continued meeting with the Veteran Engagement Team (VET) to support efforts to enhance trust and confidence in VA. The VET is a panel of 12 Veteran stakeholders who provide input on Center research and educational initiatives and help the Center identify needs to address in future initiatives. We held four VET meetings in FY 2023, covering the PTSD Treatment Decision Aid and several research grants in preparation for data collection and submission.

FY 2023 Communication Resources at a Glance

[NCPTSD Website:](#)

6,836,314 views

[Facebook:](#)

164,947 followers

[X \(formerly Twitter\):](#)

38,643 followers

[PTSD Research Quarterly:](#)

70,685 subscribers

[Clinician's Trauma Update Online:](#)

77,804 subscribers

[PTSD Monthly Update Newsletter:](#)

442,486 subscribers

[Assessment Instruments:](#)

784,473 assessments downloaded

[Mobile Apps:](#)

16 mobile apps; downloaded 542,569 times

[Professional Articles:](#)

638,028 unique views of professional articles on the NCPTSD website

[PTSDpubs Articles:](#)

69,430 PTSD- and trauma-research articles available on PTSDpubs

Educational items distributed free of charge:

685,486 items printed

About the National Center for PTSD

History

The National Center for PTSD was created in 1989 within VA in response to a Congressional mandate (PL 98-528) to address the needs of Veterans and other trauma survivors with PTSD. The National Center was developed with the ultimate purpose of improving the well-being, status, and understanding of Veterans in American society.

The mandate called for a Center of Excellence (CoE) that would set the agenda for research and education on PTSD without direct responsibility for patient care. Convinced that no single VA site could adequately serve this unique mission, VA initially established the National Center as a consortium of five Divisions.



Organization

The National Center now consists of six VA academic CoEs across the United States, with headquarters in White River Junction, Vermont. Two Divisions are in Boston, Massachusetts; two in West Haven, Connecticut; and one in Palo Alto, California. Each contributes to the overall NCPTSD mission through specific areas of focus.

The National Center for PTSD is an integral and valued component of VA's OMH, which is part of VHA. OMH and NCPTSD receive budget support from VA, although NCPTSD also leverages this support through successful competition for extramural research funding.



The National Center for PTSD was formed in 1989.



It has six Divisions across the United States, each with a distinct area of focus.



The National Center for PTSD manages the largest PTSD brain bank in the world.

Leadership in 2023



Paula P. Schnurr, PhD

Executive Director, [Executive Division](#), White River Junction, VT

Professor of Psychiatry, Geisel School of Medicine at Dartmouth



Jessica L. Hamblen, PhD

Deputy for Education, [Executive Division](#), White River Junction, VT

Associate Professor of Psychiatry, Geisel School of Medicine at Dartmouth



Paul E. Holtzheimer, MD

Deputy for Research, [Executive Division](#), White River Junction, VT

Associate Professor of Psychiatry, Geisel School of Medicine at Dartmouth



Terence M. Keane, PhD

Division Director, [Behavioral Science Division](#), Boston, MA

Professor of Psychiatry and Assistant Dean for Research, Boston University School of Medicine



John H. Krystal, MD

Division Director, [Clinical Neurosciences Division](#), West Haven, CT

Robert L. McNeil, Jr. Professor of Translational Research and Chairman of the Department of Psychiatry, Yale University School of Medicine



Craig S. Rosen, PhD

Division Director, [Dissemination and Training Division](#), Menlo Park, CA

Professor of Psychiatry and Behavioral Sciences, Stanford University School of Medicine



Rani A. Hoff, PhD, MPH

Division Director, [Evaluation Division](#), West Haven, CT

Professor of Psychiatry, Yale University School of Medicine



Tara E. Galovski, PhD

Division Director, [Women's Health Sciences Division](#), Boston, MA

Associate Professor of Psychiatry, Boston University School of Medicine