



Institute of Neurosciences,
Mental Health and Addiction
Institut des neurosciences, de la
santé mentale et des toxicomanies



Scientific Roundtable on Post-Traumatic Stress Research in Canada:

PERSPECTIVES ON CURRENT KNOWLEDGE AND FUTURE DIRECTIONS

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Canadian Institutes of Health Research
160 Elgin Street, 9th Floor
Address Locator 4809A
Ottawa, ON K1A 0W9
www.cihr-irsc.gc.ca

CIHR Institute of Neurosciences, Mental Health and Addiction
University of Calgary, Cumming School of Medicine
Heritage Medical Research Building, Room 172
3330 Hospital Drive NW
Calgary, AB T2N 4N1
www.cihr-irsc.gc.ca/e/8602.html

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Table of Contents

INTRODUCTION	4
MEETING PURPOSE	5
PTS RESEARCH IN CANADA: CURRENT STATE OF THE FIELD	6
Animal Research Models of PTS: Current State, Knowledge Gaps and Limitations	6
Clinical Study of PTS: Current State, Knowledge Gaps and Limitations	6
DETERMINANTS OF THE DEVELOPMENT OF TRAUMA- AND STRESSOR-RELATED DISORDERS AND THEIR PREVALENCE IN KEY CANADIAN POPULATIONS	8
Public Safety Personnel	8
Indigenous Peoples.....	8
DIAGNOSIS, MANAGEMENT AND PREVENTION OF TRAUMA- AND STRESSOR-RELATED DISORDERS: SCIENTIFIC EVIDENCE AND CONSIDERATIONS	10
Psychological Considerations	10
Social Considerations.....	10
Biological Considerations.....	11
RESEARCH EFFORTS THAT SHOULD BE IMPLEMENTED IN CANADA (THEMES)	12
SPECIFIC RECOMMENDATIONS FOR PTS RESEARCH IN CANADA	13
Short-Term Goals (1-3 years).....	13
Mid-Term Goals (3-5 years).....	13
Long-Term Goals (5-10 years).....	14
CONTACT US	15

Introduction

Traumatic stress can occur at any time throughout life, especially following exposure to a life-threatening event or in the aftermath of a disaster or early life adversity. Post-traumatic stress (PTS) can lead to the development of one or more trauma- or stressor-related disorders, such as post-traumatic stress disorder (PTSD).

PTS-related disorders are prevalent in multiple sectors of the Canadian population. It is estimated that PTSD affects 9% of Canadians at some point in their lives.

This roundtable meeting focused on highlighting and discussing knowledge from scientific experts across Canada and represents one component of a coordinated effort being led by the Canadian Institutes of Health Research, Institute of Neurosciences, Mental Health and Addiction (CIHR-INMHA) to develop a national research initiative for PTS.

Meeting Purpose

The primary objectives of this roundtable meeting were to:

- Bring together diverse Canadian researchers to highlight current knowledge and outline future directions in PTS research
- Discuss how knowledge gained through PTS research can be used to drive better outcomes for Canadians affected by trauma- and stressor-related disorders and their families

PTS Research in Canada: Current State of the Field

A key consideration when researching PTS is to study models of stress in animals in conjunction with clinical cases of PTSD in human patients. This section will explore the current state of the research, as well as knowledge gaps and limitations as they relate to both basic (animal) and clinical (human) research in PTS.

ANIMAL RESEARCH MODELS OF PTS: CURRENT STATE, KNOWLEDGE GAPS AND LIMITATIONS

The brain circuitry for stress behaviours in rodents is virtually identical to that in humans. Additionally, using animal models to study disease has several advantages, including the ability to directly test the cause and effect of a stimulus (such as stress), as well as the ability to safely test therapies such as medications commonly used to treat PTSD.

Through the study of brain circuitry in animals, scientists have been able to observe the effects of stress on the brain, and on an individual's behaviour. For example, animal research has shown that stress can be passed on to others in ways that may have intergenerational consequences.

There are several important considerations when using animal models to study stress, and care must be taken in applying results from animal studies to humans.

Examples of limitations that were highlighted include:

- **Individual variability:** Traumatic experiences affect individuals differently, there may be sex and gender differences, perception and response to a stressor is a highly subjective experience, and time of onset of symptoms can vary from individual to individual. These factors are difficult to study in animal models.
- **Different components of PTSD in humans:** There are different sub-types of PTSD and related behaviours in humans, and different emotional components that contribute to PTSD in humans. For example, guilt and shame may be key features of PTSD, but this cannot be studied in the fear-based animal model.

CLINICAL STUDY OF PTS: CURRENT STATE, KNOWLEDGE GAPS AND LIMITATIONS

Several themes were highlighted with respect to the clinical (human) studies of individuals affected by trauma- and stressor-related disorders.

Examples of knowledge gaps that were highlighted include:

- **Subtypes of PTSD may require studying different types of stress:** For example, studying the effects of escapable versus non-escapable stress may provide insight into the differences observed in individuals with PTSD that experience a fight-or-flight response versus those that experience detachment or a "shut-down" response.
- **Biological factors:** The effects of biological factors such as sex is understudied on certain brain regions. It was noted that these regions are similar across species, offering the potential for complementary human-animal studies. Additionally, trauma and stress affect all biological systems in the human body (e.g. immune system, inflammatory responses) and the connection of these conditions to the body and mind should be investigated.

- **Psychological factors:** Attachment to caregivers, history of early adverse experiences, parasuicide (attempted suicide) and suicide risk, and feelings of shame and guilt are all factors that were identified as crucial components of future study.
- **Social factors:** Several social factors were discussed as needing further study, including: Intergenerational trauma, effects of trauma on social cognition (how people process social information), epigenetic effects (how stress can affect the expression of genes), early intervention strategies, cultural and spiritual influences, effects of family structure and social support, and unique social factors that exist in Indigenous communities and among gender-diverse people.
- **Other gaps:** Additional limitations and gaps that were highlighted included a current lack of research on the impact of trauma in chronic illness patients, a lack of education among the public and medical practitioners with respect to PTS research findings, and a lack of access to care for individuals with mental illness, including PTSD.

Determinants of the Development of Trauma- and Stressor-Related Disorders and their Prevalence in Key Canadian Populations

This session reviewed current data regarding PTS among two key populations: Public Safety Personnel (PSP) and Indigenous Peoples. Recommendations for future research directions were also defined.

PUBLIC SAFETY PERSONNEL

There is a lack of reliable data on the prevalence of PTSD and trauma- and stress-related disorders among PSP in Canada. In addition, the emergence of PTSD among PSP might be different from that seen in military populations because public safety trauma exposure may be more chronic. It has been shown that the frequency of trauma exposure among PSP is 11 times greater compared to other groups, and the prevalence of childhood abuse is extremely high among this group as well. Furthermore, PTSD among PSP appears to be highest among subsets of this population, particularly paramedics and correctional workers who also demonstrate higher associations of simultaneous illness, such as chronic pain.

Knowledge gaps, future research directions and critical next steps:

- Coordinated efforts to replicate prevalence surveys across Canada, and to include social and cultural considerations in surveys
- Data on the distribution and patterns of occurrence of PTS in the general public, military, and veteran populations
- Prospective data that looks at populations over a long period of time (longitudinal studies)
- Collection of data to inform prevention and mitigation strategies
- Diagnostic and treatment considerations
- More access to experienced, evidence-based mental health care providers
- Legislative efforts, such as key targets to address operational and organizational stressors that are experienced by PSP

INDIGENOUS PEOPLES

Post-Traumatic Stress Disorder is extremely common among Indigenous communities. Many individuals meet all of the criteria for PTSD as identified in the DSM-5, the primary diagnostic manual for mental disorders. Within Indigenous communities, there is disproportionately high exposures to trauma, high negative evaluations of the self, elevated self-harm and suicidal behaviours, prominent sleep disturbances and problematic drug use.

Within Canada, these issues are further complicated by lasting intergenerational effects of PTSD transmission due to residential school trauma. This intergenerational trauma affects children and the entire family unit and constitutes a day-to-day reality that remains prominent today. Furthermore, poverty and despair are common, and many Canadians are unaware of these issues, further contributing to the ongoing marginalization of Indigenous communities.

With respect to PTSD treatment, Western-based approaches have been shown to be ineffective, while Indigenous methods have largely been ignored. These communities need immediate, practical treatments that incorporate an Indigenous perspective, utilizing land-based and spiritual connections to the individual, as well as community ceremonial approaches (e.g. drum circles). Western approaches often diminish Indigenous Peoples' ability to speak and be heard, and local knowledge is often dismissed, resulting in severely disrupted communication.

A central theme to consider with respect to Indigenous populations, is how to create healthy communities, focusing on enhancing wellness. To do this, we need to be aware of our own biases and pay particular attention to situations where a speaker's credibility is unfairly diminished. In turn, this will challenge researchers' and clinicians' approaches regarding how they conceptualize PTSD and its treatment as it pertains to Indigenous Peoples in Canada.

Diagnosis, Management and Prevention of Trauma- and Stressor-Related Disorders: Scientific Evidence and Considerations

The current state of PTSD diagnosis and treatment is largely inadequate. Most patients begin treatment when their symptoms are severe, and even with Canadian gold-standard treatments, these individuals still remain in the cut-off for PTSD diagnosis. Drop-out rates are as high as one in five, where patients are not completing treatment, do not have access to treatment or are not receiving treatments that actually result in functional recovery.

With regard to scientifically informed treatment approaches, there is a need to address the wide range of PTSD symptoms, including impairments in central functions such as memory, problem solving and decision making, as well as the role of guilt and shame, and the inability to tolerate positive emotions. This shift in thinking about PTSD beyond a fear-based concept was a central theme to this discussion, which focused on psychological, social and biological considerations with respect to diagnosis, treatment and prevention of PTSD.

PSYCHOLOGICAL CONSIDERATIONS

Guilt and shame have been widely reported in PTSD, but are rarely addressed in the research. This results in inadequate treatment interventions, despite these symptoms being associated with suicidality. Feelings of guilt and shame are the most common reason cited for individuals seeking US Veteran's Affairs mental health services.

Individuals with PTSD may struggle to regulate their emotions, which can also give rise to difficulties with memory, decision making, attention and processing speed (the time it takes to do a mental task). To date, no treatments exist that incorporate these factors and emphasize early intervention and prevention.

Finally, there are subtypes of PTSD, including the recently introduced dissociative subtype that require additional investigation. It is also recommended that future research on PTSD should use approaches that analyze very large sets of data to reveal patterns and trends, including machine learning and big data.

SOCIAL CONSIDERATIONS

Poor social support is the strongest predictor of PTSD development following exposure to a trauma. Additionally, family reintegration and problems surrounding loss of identity are also highly relevant to individuals with PTSD. These social factors are poorly integrated into treatment approaches, and this is particularly important with respect to maintaining social context in certain treatments, such as with internet-based therapies.

Social considerations are also essential when applying PTSD research across different groups. Research findings may not apply equally to military populations versus first responders, or with respect to Indigenous Peoples or gender-diverse individuals. In addition, youth populations display reduced tolerance to extended psychotherapies in more traditional settings and may also require unique approaches.

The family context of PTSD represents a significant knowledge gap. This includes the impact of PTSD and trauma-related illness on partners and children, as well as the intergenerational transmission of trauma and stress.

BIOLOGICAL CONSIDERATIONS

There are few evidence-based drug therapies that follow the Canadian Network for Mood and Anxiety Treatments (CANMAT) guidelines. Furthermore, findings from scientific testing of drug therapies are poorly translated into clinical practice in Canada. In addition, the inclusion of imaging data, inflammatory markers (changes in the concentration of certain proteins in the blood) and genetic markers may be useful in the treatment of PTSD, but their use and cost-effectiveness in Canada is inadequate.

Finally, there is a need to explore biological interventions that are not drug-based, such as neurostimulation (using magnetic or electrical devices to stimulate regions of the brain).

Research Efforts that Should be Implemented in Canada (Themes)

1. **Comorbidities:** The presence of one or more additional conditions co-occurring with PTSD (referred to as comorbidities) should be further examined. For example, sleep disturbances and altered stress responses are observed in the brain and the body in patients with PTSD. Additionally, there appears to be very high substance use among individuals with PTSD.
2. **Leveraging Technology:** There needs to be an effort to support and encourage people with PTSD to seek and access treatment, and technology may be useful in this regard.
3. **Personalized Medicine:** We are treating very different people and patient populations (i.e. subtypes of PTSD, Indigenous Peoples, PSP, males, females and gender diverse people, as well as youth and aging populations). We may know that some treatments are effective, but it is unclear in which populations – when do we use what, and for whom.

Specific Recommendations for PTS Research in Canada

This section is a summary of research goals and recommendations that can be accomplished in the short-, mid- and long-term.

SHORT-TERM GOALS (1-3 YEARS)

This section outlines recommendations for refining research areas that already exist.

- Examine medication-assisted psychotherapies. Current evidence suggests that using medication together with psychotherapy may be effective in relieving PTSD symptoms.
- Determine the efficacy of applying magnetic or electrical stimulation to the brain in association with psychotherapy.
- Use technology to analyze large sets of data to identify patterns and trends among patients with PTSD.
- Identify family system structures that promote better recovery in patients.
- Investigate the effects of escapable versus inescapable stress, including with respect to different stress responses (such as “fight or flight” versus “shutting down”), and chemical activity in the brain (neurotransmitters).
- Examine how guilt and shame influence PTSD symptoms, and include measures of guilt and shame when assessing patients, as well as measures of altered thinking as it relates to workplace, school and home environments.
- Explore personalized approaches to medicine and treatment, including sex-specific components of PTSD.
- Improve the efficiency and reach of current treatments, build training capacity and increase the quality of education for researchers and clinicians.
- Develop culturally-sensitive interventions for military personnel, Indigenous communities, different sexes and diverse genders, youth and PSP.
- Use patient-centred outcomes, where patients determine what factors they think are important to measure.
- Further investigate the prevalence of PTSD among PSP, military members and civilian trauma populations.
- Improve the education of clinicians and researchers regarding current scientific findings about PTSD.

MID-TERM GOALS (3-5 YEARS)

This section outlines recommendations for research areas that may already be present but that need to be more rigorously tested.

- Examine at-risk groups (e.g. Indigenous Peoples, women) as well as the intergenerational effects of trauma and how to reduce the transfer of trauma from one individual to another.
- Develop a non-human model of PTS that extends beyond a fear-based model.
- Investigate mechanisms by which traumatic experiences impact the brain and lead to mental illness or dysfunctional behaviours.

- Test the effectiveness of interventions, reporting those that are ineffective as well as those that are effective. Studies should not only focus on the reduction of PTSD symptoms but also on functional improvements (e.g. improved functioning in the workplace, home or school).
- Focus on how PTSD affects the family unit, as opposed to studying the individual in isolation.
- Implement these recommendations within existing long-term studies, where possible.
- Investigate how immune functioning, inflammatory markers and other illnesses affect the brain and the mind in PTS patients.

LONG-TERM GOALS (5-10 YEARS)

This section outlines recommendations for investigating new research areas that need to be tested and refined.

- Focus on community interventions, allotting generous time where needed (e.g. in Indigenous communities where building trust in highly traumatized populations is critical).
- Investigate how PTSD impacts Canadian society as a whole, with a focus on breaking down stigma and barriers that restrict access to treatment.
- Conduct more prospective studies in both children and adults. Prospective studies watch for predicted outcomes in a group of people over a long period of time and can be useful to identify risk or protective factors.
- More centres of excellence and improved access to mental health care are needed across Canada.



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Institute of Neurosciences,
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Institut des neurosciences, de la
santé mentale et des toxicomanies

University of Calgary
Cumming School of Medicine
Heritage Medical Research Building, Room 172
3330 Hospital Drive NW
Calgary, AB T2N 4N1

403-210-7161

INMHA-INSMT@cihr-irsc.gc.ca