Prevention Strategy Across Ministries: Toxic Stress and Resiliency

Executive Summary:

Children and youth have tremendous potential which needs to be tapped in order for our communities to thrive. As such, we all collectively have a shared obligation to create environments for our children and youth that are safe, stable and nurturing which allow them to reach their full potential during their lifetime and enable them to contribute to our communities. There is evidence that toxic stress during sensitive periods of brain development, caused by adverse childhood experiences and other stressors, results in underdevelopment of certain parts of the brain that are responsible for executive functioning and emotional regulation and which can affect learning, having stable relationships, making risky decisions regarding sex and use of substances, employability, etc., and these lead to physical, mental and economic challenges for a lifetime. Studies show that the impact of toxic stress is significant, and reducing adverse childhood experiences in North America could lead to substantial cost savings in billions of dollars. It is easier to prevent toxic stress exposure than to deal with its consequences, thus every policy that is introduced across multiple ministries should aim at early intervention to reduce financial pressures and social stressors on families and children, and provide support for resiliency-building in children and families, which can then lead to healthy economic development and our communities achieving health and well-being as defined by World Health Organization.

Research Overview:

In order to improve societies, we need a population that is healthy economically, physically and mentally. From brain science we know that **stress damages the early brain development** that shapes the foundation of cognitive, emotional, and social abilities. From Adverse Childhood Experience (ACES) and other research we know that the toxic stress comes from tensions in the environment such as abuse, neglect, family dysfunction including witnessing violence, separation from a parent, having a family member who is: imprisoned, has drug and alcoholic issues, loss of employment, mental health, separation from a parent, community violence, natural disasters, immigration and racism (see Appendix A). In an ACEs' study in Canada (Joshi et al., 2021) found 61.6% had at least one ACE, 25.7% had exposure to physical abuse, intimate partner violence (22.4%) and emotional abuse (21.8%) were the most prevalent types of ACEs. "Individuals younger than 65 years (born in 1950–1969), with **no postsecondary education or education below a bachelor's degree**, or with annual household income less than $20, 000 **reported greater exposure to ACEs**" (Joshi et al, 2021, p.1). In the same report, Joshi et al. (2021) indicate that as compared to other provinces, British Columbia reported higher prevalence for several examined categories of ACEs.

Everyone feels stress, and not all stress is harmful. Positive and tolerable stress could help bring attention and focus on important things and create motivation for problem solving. However, too much stress without a buffering support from a nurturing adult could transform it to toxic stress and evoke a toxic stress response that has lasting effect on brain development and increase health risk factors (National Scientific Council on the Developing Child, 2005/2014). If tolerable stress is frequent, it can add up over a lifetime and become toxic stress, stress can be from experiencing or witnessing relationship violence or any social determinant of health (physical environment, social supports and coping skills, income and socioeconomic status, employment and working conditions, education & literacy, childhood experiences, health behaviors, access to health services, biology and genetics endowment, gender, culture, race and racism) and changes in cognitive, emotional and brain development may start in-utero (Mueller & Tronick,2019). High-level toxic stress from trauma has **generational impacts.** It results in neurological changes and physical ailments. "Stress results in changes in the brain (Center on Developing Child, n.d.) and the remainder of the neurological system and has huge social and health impacts (psychological, social, physical, and cognitive) (Gurm et al, 2020) (see Appendix B). The social and economic cost of toxic stress is difficult to estimate, but it is assumed to be in the hundreds of billions of dollars per year. **"A 10% reduction in ACEs in North America could equate to an annual savings of $56 billion" (CDC, 2022).**

Analysis of Research Findings:

The damage can start from conception onwards because by week 23 of conception, the material that is going to become the brain is encapsulated. The environment in the community actually causes physiological changes in an infant's/child's brain. During the early years, the brain is particularly receptive and responsive to certain types of environmental stimuli. These periods are critical for the development of various skills, abilities, and functions, and not having appropriate support may lead to irreversible consequences. These **sensitive periods** include:

1. **Prenatal period**: The prenatal period, which begins at conception and ends at birth, is a critical period of brain development. During this time, the brain is developing at a rapid pace, and experiences such as maternal stress, poor nutrition, or exposure to harmful substances can have lasting effects on brain development.
2. **Infancy**: The first few years of life are a critical period of brain development. During this time, the brain is rapidly developing neural connections in response to experiences in the environment. The development of language, motor skills, and social-emotional skills is particularly sensitive during this period. The brain is highly sensitive to sensory input.
3. **Early childhood**: The period from ages 3 to 5 is another critical period of brain development. During this time, the brain continues to develop rapidly, and experiences such as high-quality early education, positive relationships with caregivers, and exposure to rich language and literacy environments can have a significant impact on later academic and social-emotional outcomes.
   A) Children's brains are highly receptive to language during the first few years of life, making it easier for them to learn multiple languages and acquire strong language skills.
   B) It is a sensitive period for social and emotional development, as children learn to form attachments, regulate emotions, and understand social cues.
   C) The visual system undergoes rapid development during the first few months of life, and early experiences with visual stimuli are essential for the proper development of vision.
   D) Children learn to control their bodies and refine fine and gross motor skills.
   E) Early experiences with sensory stimuli, such as touch, taste, smell, and hearing, are critical for the proper development of the sensory system
4. **Adolescence:** Adolescence is a critical period of brain development, as the brain undergoes significant changes in structure and function during this time. The development of executive function skills, such as planning, impulse control, and decision-making, is particularly sensitive during adolescence.

During these sensitive periods, the foundation for brain development is formed, a strong or a weak foundation can be created. Moreover, the Adverse Childhood Experiences (ACEs) research has shown that **early negative experiences can have long-lasting effects on a child's health, behavior, and future opportunities**. If there is serious and prolonged stress, toxic stress, a weak foundation is created and it can lead to economic, physical and mental challenges for a lifetime. Toxic stress caused by stressors can cause the infant's brain to release a chemical that diminishes cell growth.

Just as ACEs and a toxic stress response can interfere in healthy brain development at all stages of development, there is evidence that the brain architecture can change through neuroplasticity when there is a safe, stable, and nurturing environment. There is also evidence through the science of epigenetics, that irrespective of the genes that a child inherits, how, when and which genes will be expressed over the lifetime depends on environmental exposure and lifestyle choices. There are opportunities at every subsequent stage of development starting from birth to mitigate the adverse impact on brain development from a previous stage of development. A typical brain development as a result of maternal stress during pregnancy that results in a higher risk of psychopathology in the baby may be mitigated through supportive environments during early postnatal life that may promote brain development and reverse atypical developmental trajectories induced by prenatal stress (Nolvi et al., 2023). Construction of brain architecture is an ongoing process that begins before birth and continues into adulthood. In the first few years of life, **as per Harvard University, Center for Child Development, more than 1 million new**

neural connections are formed every second; and every early experience can either be a support or a barrier to this developmental process. The highlights of the science of early child development include (Center on the Developing Child 2007):

1. Brains are built over time from the bottom up.
2. The interactive influences of genes and experience shape the developing brain
3. The brain's capacity for change decreases with age
4. Cognitive, emotional, and social capacities are inextricably intertwined throughout the life course
5. Toxic stress damages developing brain architecture, which can lead to lifelong problems in learning, behavior, and physical and mental health
6. Policy implications include:
   A. The basic principles of neuroscience indicate that early preventive intervention will be more efficient and produce more favorable outcomes than remediation later in life.
   B. A balanced approach to emotional, social, cognitive, and language development will best prepare all children for success in school and later in the workplace and community.
   C. Supportive relationships and positive learning experiences begin at home but can also be provided through a range of services with proven effectiveness factors. Babies' brains require stable, caring, interactive relationships with adults — anyway or any place they can be provided will benefit healthy brain development.
   D. Science clearly demonstrates that, intervening as early as possible is critical to achieving the best outcomes. For children experiencing toxic stress, specialized early interventions are needed to target the cause of the stress and protect the child from its consequences.

Recommendations:

It is much easier to prevent toxic stress exposure than it is to deal with the emotional, physical and economic stressors of a person over a lifetime. Therefore, by intervening early, governments can provide families and children with the **necessary support and resources** to overcome adverse experiences and promote positive development. Early interventions for expectant parents such as: food and shelter, employment, stress reduction and conflict resolution skills, and physical safety measures. Starting with infants quality education, healthcare, and mental health services, can improve children's physical and emotional health, increase their academic achievement, and reduce the likelihood of future societal problems such as poverty, crime, and unemployment. If governments provide family mental health and support services early, society can prevent many mental and physical health challenges. When governments invest in well trained educated early childcare providers with livable salaries, they help build a strong foundation for children. These early investments in support have huge dividends as **child development translates into economic development later on**. A child with a solid foundation becomes part of a solid community and contributes to our society.

Therefore, all ministries and public institutions need to work together, take a whole system approach, to create brains that are strong and healthy and have resiliency to address life's challenges. To do this, **there needs to be a central office to coordinate all programs and services across the lifespan**.

Governments need to:

1) Provide Funds **2) Implement evidence-based programs** **3) Perform Evaluations**

A few examples of **evidence-based programs** that can help support sensitive periods of brain development in children are:

- **Early Head Start and Head Start:** These federally funded programs provide comprehensive services, including education, health, nutrition, and family support services, to low-income children and families. The

programs aim to support children's cognitive, social, emotional, and physical development during their critical early years.

- **Montessori education:** This approach emphasizes child-led learning, where children are free to explore and learn at their own pace, within a structured environment. Montessori classrooms are designed to support sensitive periods of development, including language acquisition, motor development, and social-emotional development.
- **Music and art programs:** Exposure to music and art during early childhood can help support cognitive, social, and emotional development. These programs can enhance language skills, promote creativity, and support the development of fine motor skills.
- **Physical activity programs:** Regular physical activity during early childhood can help support gross motor development, improve cardiovascular health, and promote overall well-being.
- **Parenting programs:** Parenting programs can help parents understand the importance of sensitive periods of brain development and provide strategies for supporting their children's growth and development. These programs can include parenting classes, home visiting programs, and parent support groups. Examples:

By supporting children's sensitive periods of brain development, these programs can help children build a strong foundation for future learning, health, and well-being.

There are several programs that can be **implemented before conception and during pregnancy** to support optimal prenatal development and set the stage for healthy brain development. Here are a few examples:

- **Preconception health care:** Providing preconception health care to women of reproductive age that addresses any underlying health conditions, providing genetic counseling, and healthy relationship skills, as well as information on healthy lifestyle choices and stress reduction programs can ensure they are healthy & ready for pregnancy
- **Folic acid supplementation:** Folic acid is a B vitamin that is important for proper fetal development, especially for the development of the neural tube. The neural tube is formed by week 23 of conception and contains all the material that will become the brain. Women are advised to take 400 micrograms of folic acid daily before and during early pregnancy.
- **Prenatal care:** Prenatal care is critical for monitoring the health of the mother and fetus and identifying any potential problems early on. This can include regular check-ups, ultrasounds, and screening for health conditions, as well as providing support for healthy relationships during pregnancy to help mitigate the risk of violence and ensure the health and well-being of both the mother and the fetus.
- **Nutrition and healthy lifestyle choices:** Eating a healthy diet, staying physically active, and avoiding harmful substances such as alcohol and tobacco can support optimal fetal development and set stage for healthy brain development. Programs on reading food labels and cooking healthy meals are essential.
- **Stress reduction programs:** High levels of stress during pregnancy can negatively impact fetal development, so providing stress reduction programs such as mindfulness-based stress reduction or prenatal yoga can be beneficial.
- **Healthy communication:** Communicating effectively can reduce conflicts that can reduce stress, so providing programs such as conflict resolution, empathy, and basic communication can be beneficial to building health relationships.

Implementing these programs before conception and during pregnancy along with the programs below can support optimal prenatal development and set the stage for healthy brain development. By supporting healthy fetal development There are several, communities promote healthy outcomes for children and families.

A few examples of **programs to help cope with stress** for families and workplaces that have been **found to be successful** in reducing stress and promoting well-being are:

- **Mindfulness-based stress reduction (MBSR):** MBSR is a program that combines mindfulness meditation and yoga to help individuals manage stress, anxiety, and chronic pain. MBSR has been found to be effective in reducing stress and improving well-being in a variety of populations, including families and workplace settings.
- **Cognitive-behavioral therapy (CBT):** CBT is a type of talk therapy that helps individuals identify and change negative thought patterns and behaviors that contribute to stress and anxiety. CBT has been found to be effective in reducing stress and improving mental health outcomes in both family and workplace settings.
- **Employee assistance programs (EAPs):** EAPs are workplace-based programs that provide confidential counseling and support services to employees and their families. EAPs can help employees manage stress and mental health concerns and provide referrals to other resources as needed.
- **Work-life balance programs:** Work-life balance programs can include flexible work arrangements, such as telecommuting or job sharing, as well as programs to support employee wellness, such as fitness programs or mental health resources. These programs can help employees manage stress and maintain a healthy work-life balance.
- **Family therapy:** Family therapy can help families manage stress and improve communication and relationships. Family therapy can be beneficial for families experiencing a variety of stressors, such as financial stress, parenting challenges, or relationship problems.
- **Housing:** Having stable housing that is affordable helps reduce stress and create a positive space
- **Employment:** Creating multiple pathways to training and employment helps reduce stress and create a positive environment.
- **Racism free environments:** Having environments that promote equity and inclusion can decrease racism and lead to decreased stress.

Any one program or developmental time period alone cannot be effective in reducing stress and promoting well-being for families and in workplace settings. By breaking silos across ministries and different levels of government and having a coordinated and networked response, the ACES cycle can be disrupted over a generation. By **creating wellness centers with a one stop shop** (health, employment, housing, education, justice, social programs) **coordinating resources across ministries, all levels of government**, and the non-profit sector, governments can help individuals and families cope with life's challenges and promote overall health, economic, and social success.

All levels of government need to work together to streamline programs and create a comprehensive approach to supporting early development. This can be achieved by establishing a central agency to coordinate these efforts and including a **pre and post evaluation process** to measure the effectiveness of these initiatives as well as the reduction in ACEs over time. Many ministries will see a long-term **reduction in costs**, including Health, Mental Health and Addictions, Social Development & Poverty Reduction, Children and Families, Justice, Indigenous Relations and Reconciliation. In addition, investing in early development will result in an increase in post-secondary education, future skills, labor force, food security, and other areas for healthy growth of the country. By prioritizing collaboration and investing in preventative measures, we can create a brighter future for all Canadians.

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Appendix A:

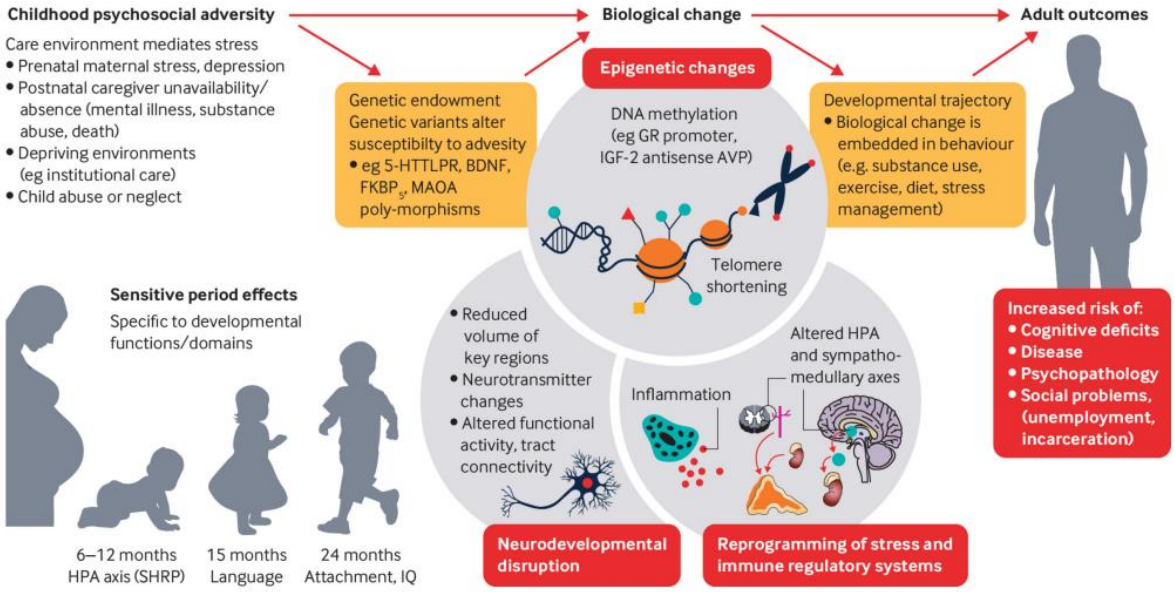
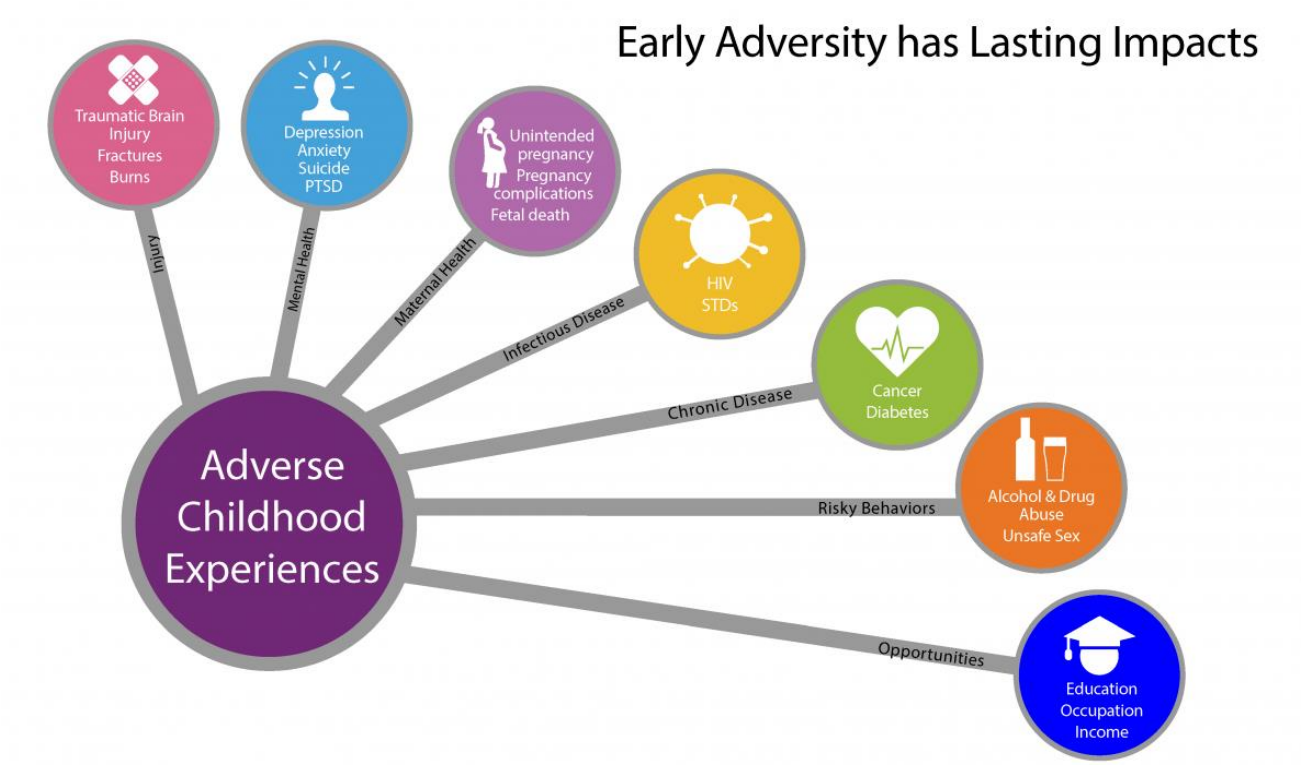


Fig 2 | Some of the pathways that mediate exposure to early adversity and adult outcomes. Exposure to adversity early in life interacts with a child's genetic endowment (eg variations in genetic polymorphisms), which in turn leads to a host of biological changes across multiple levels. These changes, in turn, influence adult outcomes (adapted from Berens et al[23]). HPA axis (SHRP)=hypothalamic pituitary adrenal axis (stress hyporesponsive period)

Appendix B:


Early Adversity has Lasting Impacts
Adverse Childhood Experiences
Injury
Traumatic Brain Injury
Fractures
Burns
Mental Health
Depression
Anxiety
Suicide
PTSD
Maternal Health
Unintended pregnancy
Pregnancy complications
Fetal death
Infectious Disease
HIV
STDs
Chronic Disease
Cancer
Diabetes
Risky Behaviors
Alcohol & Drug Abuse
Unsafe Sex
Opportunities
Education
Occupation
Income