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Title: The Human Toll of Collective Trauma: The Ravages of War and Persecution

Authors: 1. Thomas R. VERNY, MD¹, 2. Olga GOUNI²

OVERVIEW

Abstract

This paper explores the concept of historical trauma (HT) as an extension of post-traumatic stress disorder (PTSD), expanding the definition to encompass the accumulated emotional and psychological trauma across generations and lifespans. Coined by Lakota social work professor Maria Yellow Horse Brave Heart, HT refers to the enduring impact of abuse and displacement on marginalized groups, such as enslaved African Blacks, Native Americans, Indigenous people in Canada, and others globally. HT becomes ingrained in cultural memory, impacting individuals with symptoms including depression, survivor guilt, anger, substance abuse, hypervigilance, and more.

Examining the distinction between history and collective memory, the paper delves into the effects of persecution and oppression on specific groups, emphasizing chronic and severe stress. The focus extends to genocides worldwide, exploring maternal stress's impact on fetal development, drawing insights from events like the Ice Storm in Quebec, the Leningrad siege, and the Dutch famine. The paper concludes by questioning whether interventions can mitigate the maternal/paternal transmission of stress-induced pathologies, providing avenues for further research and potential solutions to alleviate the enduring effects of historical trauma.

Keywords

Historical Trauma, Post-Traumatic Stress Disorder (PTSD), Intergenerational Trauma, Cultural Memory, Collective Memory, Marginalized Groups, Holocaust, Survivor Guilt, Maternal/ Paternal Stress, Fetal Development, Genocide, Persecution, Oppression, Chronic Stress, Mental Health, Interventions, Resilience, Cultural Identity, Psychotherapy.

Introduction

Trauma is defined as an experience that causes extreme fear, helplessness, or terror. Post-traumatic stress disorder (PTSD) is a kind of trauma that has received a lot of attention recently. PTSD develops when a person feels overwhelmed and powerless in a life-threatening circumstance. PTSD has long-term and often incapacitating symptoms.

The definition of PTSD needs to be broadened to encompass historical trauma (HT), a concept introduced by Lakota social work professor Maria Yellow Horse Brave Heart in the early 1980s. She meant "the accumulated emotional and psychological trauma across the lifespan and across generations". HT refers to the abuse and displacement of marginalized groups such as enslaved African Blacks and Native Americans in the United States, Indigenous people in Canada, Aboriginals in Australia, Jewish people in Europe under the Nazis, American POW Japanese camp survivors, Afghan refugees, and the list goes on. HT becomes ingrained in a people's cultural memory.

¹ Thomas R. VERNY, MD, <https://orcid.org/0009-0005-4089-6213>

² Olga Gouni, <https://orcid.org/0000-0002-2437-9997>, Affiliation: Prenatal Sciences Research Institute, SOPHIA, correspondent author: info@cosmoanelixis.gr

Individuals suffering from HT experience enduring and pervasive symptoms of depression, survivor guilt, anger, intense fear, self-destructive behavior such as substance abuse, hypervigilance, dissociation, low self-esteem, dreams of being violated, involuntary and intrusive memories of the traumatic event, memory loss for other parts of that event, lack of ability to concentrate, impairment of social functioning, and feelings of detachment or estrangement from others.

Children, grandchildren, and later generations of survivors tend to internalize their ancestors' pain and see any fun or joy in their current lives as a betrayal of their ancestors' suffering. Expectant mothers and children persecuted and threatened with violence and death carry this Historical or Collective trauma in their memory. Thus, HT/CT³ becomes embedded in the cultural memory of a people.

History and Collective Memory

History is not the same as collective memory. Whereas historians strive to construct a somewhat objective account of the past by adhering to strict Professional Standards of what constitutes evidence, individuals of a community recollect their collective past through the lens of a contemporary set of concerns.

Collective memory presents a deliberately rebuilt history in the service of collective identity, endowing those societies with a story of continuity and identity over time.

The focus of this chapter is on the effects of persecution and oppression on specific groups of people in terms of stress⁴ and how it affects their own and their children's physical and mental health through one or more generations.

The consequences of persecution and oppression on targeted groups of people.

Down the History Lane

A. *Colonization and Slavery*

Unfortunately, this has a long and well-known history. Under colonial systems, the settlers dispossessed indigenous residents or built legal and other frameworks that disadvantage them systematically, establishing foreign control over target lands or peoples. After killing, assimilating, or driving away indigenous peoples in colonies established by Western European countries in the Americas, Australia, and New Zealand, settlers eventually formed a large majority of the population. Elsewhere, Western European settlers established minority groups that frequently dominated the non-Western European majority. Certainly, colonization is not just a new thing. Its roots are lost in the ancient times, all the way through the classical times, to the Middle Ages and beyond reaching our times, of course taking different forms but remaining the same.

Most people are unaware that between 1525 and 1866, 12.5 million Africans were carried to the new world, with 10.7 million surviving the perilous Middle Passage and disembarking in North America, the Caribbean, and South America, according to the Transatlantic Slave Trade database.

The most dramatic and catastrophic attempt at colonization occurred in the mid-twentieth century, and it was pursued with Nazism. Hitler, Heinrich Himmler, and their followers planned a huge migration of Germans to Eastern Europe, where some of the Germans would become colonists with authority over the indigenous people. These indigenous people were to be turned to slaves or destroyed entirely.

Many advanced countries now have a considerable number of guest workers/temporary work visa holders who are brought in to conduct seasonal jobs such as harvesting or low-paid physical labor. Guest employees or contractors have a lower status than visa workers because they can be fired at any time for any reason.

³ HT/CT: Historical Trauma/ Collective Trauma

⁴ When there is reference to stress, the authors refer to chronic and severe stress.

Furthermore, as highlighted by Paul Virilio [1], colonization may be a domestic approach when there is a broad security danger within a country and weapons are turned inward. Obsession with security leads to the endo-colonization of society and the employment of increasingly powerful and omnipresent security technology directed inward. It is the increasing dominance of stories of dangerous otherness and distrust in public life. It is the growing dominance of public life.

Slavery was a common aspect of civilization throughout history permitted in most communities [2].

Slave treatment in the United States [3] varied greatly based on the circumstances, time, and location. Slavery's power dynamics warped many whites in positions of control over slaves, with children displaying their own cruelty. To impose their will, masters and overseers used physical punishments. Whipping, shackling, hanging, beating, burning, mutilation, branding, and incarceration were all used to punish slaves. Punishment was most typically meted out in response to disobedience or perceived violations, but abuse was also used to re-establish the master's or overseer's power over the slave. Large plantations, which were frequently controlled by overseers and owned by absentee slaveholders, received harsher treatment.

In China, slaves were primarily obtained from southern tribes, including Thais and aboriginals from Fujian, Guangdong, Guangxi, and Guizhou. During the Tang dynasty, Malays, Khmers, Indians, and "black skinned" peoples (either Austronesian Negritos of Southeast Asia and the Pacific Islands, or Africans, or both) were also purchased as slaves.

Chinese Muslim (Tungans) Sufis accused of practicing xiejiao (heterodox religion) were exiled to Xinjiang and sold as slaves to other Muslims, including Sufi beggars [4]. Han Chinese who committed crimes, such as trading with opium, were forced to work as beggars under Qing legislation. The majority of Chinese in Altishahr were Turkestani Begs' exile slaves. While free Chinese merchants did not often participate in relationships with East Turkestani women, certain Chinese slaves belonging to begging, as well as Green Standard troops, Bannermen, and Manchus, engaged in serious encounters with East Turkestani women.

Slaves made up around one-fifth of the population in Constantinople [5]. In the 15th and later centuries, the city was a prominent center of the slave trade. Slaves were obtained by Tatar attacks on Slavic villages, who abducted slaves in southern Russia, Poland-Lithuania, Moldavia, Wallachia, and Circassia and sold them in the Crimean port of Kaffa [6]. Over the 16th and 17th centuries [7] around 2 million largely Christian slaves were exported until the Crimean Khanate was destroyed by the Russian Empire in 1783.

Slaves were also obtained through conquest and the suppression of rebellions, after which entire communities were sometimes enslaved and sold across the Empire to reduce the possibility of future insurrection. Slaves were also purchased by the Ottomans from traffickers who transported slaves into the Empire from Europe and Africa. Between 1800 and 1909, an estimated 200,000 slaves, mostly Circassians, were transported into the Ottoman Empire [8]. Women slaves were being sold in the Ottoman Empire as late as 1908.

Slavery was widespread in India by the sixth century BC, and possibly as far back as the Vedic period. Slavery became more prevalent following the Muslim conquest of northern India after the 11th century. After the 16th century, slavery persisted in Portuguese India. The Dutch, too, traded extensively in Abyssian slaves, known as Habshis or Sheedes in India [9]. Until the 1660s, the biggest sources of forced labor were Arakan/Bengal, Malabar, and Coromandel.

Between 1626 and 1662, the Dutch exported 150-400 slaves per year from the Arakan-Bengal coast. During the first 30 years of Batavia's existence, Indian and Arakanese slaves served as the Dutch East India Company's Asian headquarters' principal labor force.

The English deported 665 slaves from Fort St. George in Madras in September 1687. In 1694-96, as fighting ravaged South India once more, private people transported a total of 3,859 slaves from Coromandel into Ceylon. The entire volume of the Dutch Indian Ocean slave trade has been estimated to be 15-30% of the Atlantic slave trade, somewhat less than the trans-Saharan slave traffic, and one-and-a-half to three times the size of the Swahili, Red Sea coast, and Dutch West India Company slave

trades. According to Sir Henry Bartle Frere (a member of the Viceroy's Council), there were an estimated 8 or 9 million slaves in India in 1841.

Many colonists [10] came to colonies to sell slaves to their colonial countries, therefore the legal right to leave or remain may not be as important as the people's real presence in the new country. As a result, the indigenous natives of their nations were degraded to the state of property and were made slaves in their own countries.

Although most forms of slavery are clearly involuntary and require the captive's compulsion, there is also voluntary slavery, which is entered into by the enslaved to pay a debt or get money due to poverty. In chattel slavery, the enslaved individual is legally made the slave owner's personal property (chattel). In economics, *de facto* slavery refers to the conditions of unfree labor and forced labor that most slaves are subjected to.

Even though slavery is illegal, roughly 40 million individuals, 26 percent of whom minors, were enslaved worldwide in 2019. In the modern world, more than half of all enslaved individuals work as slaves, usually in factories and sweatshops in a country's private sector. Human trafficking [11] is a modern kind of slavery in developed countries; in developing countries, enslavement by debt bondage is a frequent form of enslavement, such as captive domestic servants, forced marriage, and child soldiers [12].

Of course, lynchings occurred in the United States after slavery was abolished.

B. Lynchings

Between 1882 and 1968, the Tuskegee Institute recorded 3,446 black lynchings and 1,297 white lynchings, with the peak occurring in the 1890s. A lynching is the public execution of a person who has not received due process. These executions were frequently carried out by unruly crowds; however, police personnel did take part in the name of justice. A typical lynching began with a criminal accusation, an arrest, and the gathering of a mob, followed by the victim's seizing, physical suffering, and murder. They were frequently public spectacles attended by whites in celebration of white supremacy. They are commonly associated with images of Black men and women hanging from trees. "Southern trees bear a strange fruit, blood on the leaves and blood at the root. Black bodies swinging in the Southern breeze, strange fruit hanging from the poplar trees" [13]. The victims were tortured, mutilated, decapitated, or were set on fire. Lynching photographs were frequently marketed as souvenir postcards.

According to the archives of the **National Association for the Advancement of Colored People** (NAACP), there were 4,743 lynchings in the United States between 1882 and 1968. Other versions, such as the Equal Justice Initiative's detailed lynching report, count slightly different numbers, but it's hard to tell for sure how many lynchings occurred because there was no institutional documentation. Many historians believe the true figure is underestimated.

Lynching primarily affected black people: 3,446, or around 72% of those lynched, were black. They were not, however, the sole victims of lynching. Some white people were lynched because they aided Black people or were anti-lynching. Mexican, Chinese, Australian, and other immigrants were also lynched.

C. Genocides

While Raphael Lemkin developed the concept of genocide [14] in the mid-20th century, the expansion of various European colonial powers such as the British and Spanish empires, and the subsequent establishment of colonies on indigenous territory, frequently involved genocidal violence against indigenous groups in the Americas, Australia, Africa, and Asia. According to Lemkin, colonization was "inherently genocidal", and he regarded genocide as a two-stage process, the first of which was the destruction of indigenous peoples' way of life. The newcomers forced their way of life on the indigenous people in the second stage.

The concept of crimes against humanity was introduced into international relations for the first time in 1915, one year after the outbreak of World War I, when the Allies of World War I sent a letter to the

government of the Ottoman Empire, a member of the Central Powers, to protest against the massacres that were taking place within the empire, including the Armenian genocide between 1916 and 1917, which killed 1.5 million Armenians, the Assyrian genocide, the Greek genocide, the Serbs' genocide, the Great Famine of Mount Lebanon [15], [16], The Holocaust, the Nazi slaughter of 6 million European Jews during World War II, is the most researched genocide and a prototype of genocide; one of the most contentious issues among comparative academics is the Holocaust's uniqueness.

Between 1918 and 1921, there were pogroms in Russia, Ukraine, and Poland. During the Cold War, both anti-communist/capitalist and Communist regimes perpetrated mass crimes, including the 1965-66 Indonesian mass murders, the 1971 Bangladesh genocide, the Cambodian genocide, and the East Timor massacre. During the Rwandan Civil War, between 7 April and 15 July 1994, the Rwandan genocide occurred. Members of the Tutsi minority ethnic group, as well as some moderate Hutu and Twa, were slain by armed Hutu militias during this 100-day period. The most frequently recognized academic estimates place the number of Tutsi dead between 500,000 and 662,000.

In 1985, the United Nations (UN) Whitaker Report designated the slaughter of 100,000 to 250,000 Jews in more than 2,000 pogroms as an act of genocide as part of the White Terror during the Russian Civil War; it also urged that ecocide, ethnocide, and cultural genocide be considered. The Genocide Convention was enacted by the United Nations General Assembly on December 9, 1948, and went into force on January 12, 1951. The convention entered into force as international law on January 12, 1951, when the required twenty nations became parties; however, only two of the five permanent members of the UN Security Council were parties to the treaty, causing the convention to languish for more than four decades.

During World War II, the Ustaše regime in the Nazi puppet state of Independent State of Croatia (NDH) systematically persecuted Serbs, executing them in death camps, engaging in mass murder, ethnic cleansing, deportations, forced conversions, and war rape. This genocide, occurring between 1941 and 1945, aimed to create an ethnically pure Greater Croatia, aligning with Nazi racial policies. The Ustaše movement's ideological roots, tracing back to the 19th century, portrayed Serbs as an inferior race. Nationalist tensions in the Kingdom of Yugoslavia and anti-Croat policies fueled the rise of the Ustaše, an ultranationalist organization founded by Ante Pavelić, with support from Benito Mussolini.

July 1995, Srebrenica massacre or genocide took place in retaliation for civilian casualties inflicted on Serbs by Bosniak soldiers from Srebrenica under command of Naser Orić. The genocide of over 8,000 Bosnian Muslim men and boys was Europe's worst episode of mass murder since World War II. The Srebrenica tragedy, fuelled by the usual eons-long motives for land and resource acquisition, and justified as an attempt to bring about ethnic cleansing and safety for citizens, signalled the failure of the UN at peacekeeping in areas afflicted with civil wars, and it left deep emotional scars on survivors and many generations to follow. In 1999, UN Secretary-General Kofi Annan wrote "Through error, misjudgement and an inability to recognize the scope of the evil confronting us, we failed to do our part to help save the people of Srebrenica from the [Bosnian] Serb campaign of mass murder [17]". The report concluded saying that "The tragedy of Srebrenica will haunt our history forever."

Additionally, during the NATO aggression on SR Yugoslavia in 1999, Kosovo was forcibly separated from Serbia, creating geopolitical implications that continue to be a source of contention.

D. The Yazidi Genocide in 2014

The Yazidis, a minority population native to Kurdistan, an area of Western Asia that includes Iraq, Syria, and Iran, have been persecuted since the advent of Islam and the early Muslim conquests during the 7th and 8th centuries. The Yazidis, also known as "the servant of the creator" [18], [19] or "divine being" [20] according to another etymology of their name originating from the old Iranian word yazata or middle Persian word yazad, have roots in the pre-Zoroastrian Iranian faith. They are non-Muslim Kurds who were ruthlessly punished by Sunni Kurds, Arabs, Persians, Turks, and Muslim Kurds because they were seen as heretics by Muslim clerics. Even though it is asserted that religious differences are

the cause of the persecution, which in no way qualifies such actions, the real drivers of the phenomenon were once more the desire to control trade routes, a wish for territorial control, and money in the form of taxes, among other power and money-related concerns. Since 1724, the neighboring Sunni Kurdish tribe of Mizuri has claimed that Yazidis are heretics and apostates. The power/conflict game persisted for decades, and by the early 19th century, Yazidis were embroiled in a protracted struggle with the nearby Sunni Kurdish tribe of Mizuri, who had maintained since 1724 that killing Yazidis was required by religion since they were heretics and apostates. The Yazidis have been persecuted for generations because some adherents of other monotheistic religions in the area think that the Peacock Angel is a representation of their own unredeemed wicked spirit Satan [21], [22]. The Armenian genocide of 1915 resulted in a large exodus of Yazidis to Transcaucasia during World War I.

Of course, the persecution persisted, and in 1918 the Ottomans gave the Yazidis of Shingal Mountain an ultimatum to hand over the weapons and the Christian refugees they were hosting or face repercussions. The emissaries were sent back nude, and the Yazidis tore up the letter. The crimes persisted right up until very recently in 2014 when ISIS fighters arrived in the towns and villages at the foot of Mount Sinjar on August 3, 2014, from all directions [23]. They occupied town after hamlet, concentrating on capturing Yazidis who, until ISIS's onslaught, made up the majority of the population here. Nearly all villages were empty within 72 hours. About 50,000 Yazidis were stuck on Mount Sinjar, surrounded by ISIS fighters, and under siege. Around 200,000 Yazidis escaped to the mountain. The imprisoned people experienced incredibly difficult conditions, as they were unable to acquire food, water, or medical attention while the temperature climbed above 50 degrees Celsius. ISIS opened fire on US-American, French, Iraqi, British, and Australian forces' planes, and helicopters as they attempted to deliver supplies or rescue people off the mountain. Before Kurdish forces and Yazidi volunteers were able to open a corridor and relieve the besieged, hundreds of men, women, and children perished from malnutrition or dehydration because of this siege [24]. Women who were captured were often led to suicide or were treated as sex slaves or war loot. Those who accepted Islam were sold as brides, while those who rejected it faced torture, rape, and eventual execution.

Babies born inside the women's prison were taken away from their moms and left to an unknown fate [25], [26]. The United Nations stated in October 2014 that ISIL had killed more than 5,000 Yazidis and kidnapped 5,000 to 7,000 of them, mostly women and children [27]. ISIS has made a clear case for theological/religious justification for enslaving Yazidi women in their digital journal Dabiq [28].

Unfortunately, it will take a long time for the historical trauma (sex, rape, persecution, genocidal trauma) to heal, and generations in the future may be forced to endure decades of suffering [29], [30]. One may wonder how many centuries it will take for humanity to put an end to brutality, retaliation, and death committed in the name of God or any other deity, as well as how many centuries it will take for humanity to heal the historical traumas that have already been committed throughout the world.

E. Residential Schools Canada

There is a direct connection between the intentional eradication of indigenous culture, families, and communities by the residential schools and detrimental effects on one's physical and psychological well-being for many generations to come. Canada had residential schools for native children from the 17th century until the 1990s. At least 150,000 First Nations, Inuit, and Métis children are thought to have attended residential schools at this time. As a crucial component of colonialism, these schools were mostly run by specific churches and religious institutions and were managed and sponsored by the federal government. Indigenous peoples were forced to adopt the system as part of a large-scale assimilation campaign that aimed to eradicate their distinctive cultures, obliterate their identities, and bury their pasts. Indigenous peoples challenged the system in a variety of ways during this time. The efforts of residential school survivors to share their experiences and seek redress have played a significant role in raising public awareness of the negative consequences of these institutions. The Residential School System was proposed by the National Centre for Truth and Reconciliation for consideration under the National Program of Historical Commemoration, and it was chosen as a national historic event with the help of survivors from all around Canada. The Canadian government,

in a way, acknowledges the unfair system towards the indigenous people and is working to restore justice, according to the Commission's Call to Action 79 [31], which is reinforced by the paragraphs 80–83. However, it will take a long time to recover from centuries of contempt and, worse still, attempts to eradicate indigenous cultures and identities.

F. Caste systems

And then there is the caste system in India. Nobody likes to talk about it, but it's present. The caste system, which dates back more than 3,000 years, divides Hindus into four primary groups based on their ancestry, karma, and previous lives: Brahmins, Kshatriyas, Vaishyas, and Shudras. The Laws of Manu, a Hindu scripture composed approximately 250 B.C., were the first to describe the caste system. In accordance with the caste of your family, your caste is determined at birth. Many people think that Brahma, the Hindu God of creation, is where the system came from. They think that **Brahmins** represent Brahma's eyes and mind and are therefore frequently **teachers** and **priests**, that **Kshatriyas** are his arms and are frequently **warriors**, that **Vaishyas** are his legs and are frequently **farmers or merchants**, and that **Shudras** are his feet and are frequently **laborers**.

India's population is further split by the system's thousands of sub-castes, despite the existence of four primary castes. The Untouchables or Dalits are a completely different caste that society considers to be so abhorrent that they aren't even thought of as being a part of the system. They are regarded as being so unclean, it is banned for them to utilize the same water, streets, etc. as upper castes. They are totally rejected by society. Mahatma Gandhi devoted a large portion of his life to promoting Dalit equality. He used to call Untouchables "Harijans," which is Hindi for "children of God."

The caste system, which dictates where people can live, what jobs they can have, who they can speak to, and even what rights they may have, is still widely used in villages throughout India, even though many larger cities have moved away from such a strong caste impact.

The rules and effects of this system, which is so ingrained in the national culture remain, even though statistics speak of most of the Indian population to not experience discrimination traumas. However, even today, many people experience discrimination because of their origin, they are intimidated, humiliated, and live in terror. For example, students who are constantly bullied later find it difficult to find employment. The most vulnerable individuals will occasionally resort to selling their daughters as sex slaves or forcing their children into illegitimate marriages to survive (devadasi).

However, Dalits also must deal with mental stress. It is not uncommon for young people who work hard and are fortunate enough to enrol in college (just 14.4% of Dalits in higher education overall) to commit suicide because of ongoing abuse and harassment from other students or even from teachers. This makes it difficult to earn a living, provide a daily bread, or live a normal life without financial difficulties, laying the groundwork for even more heinous deeds [32]. It seems that unless anything happens, the caste system will endure for a very long time.

Many African countries have societal hierarchies like caste system based on social groupings, inherited opportunities, and language that determine occupation, wealth, and social status. Every class has its own unique traits, functions, rights and obligations, and relationships with other groupings. Few communities that depend on hunting and gathering do not have a structured class system. Traditional African cultures are hierarchical, divided into tiers much like a cake. The hierarchy within African class systems is governed by three fundamental concepts. The first of these is elderhood, which is the state of being senior to another person. The second is servitude, which is the state of being in charge of or under the direction of someone else. The third factor is rank, which refers to a person's standing in relation to the ruling class. African societies now have a patchwork class structure. It is shaped by a number of traditions that date back to precolonial times. Other components have a Western impact, too. As fresh forces of change penetrate African communities, the end outcome is a complicated framework that is continually evolving.

Saudi Arabia has also a rigid hierarchy based on social stature, religion, and gender, too. The road to equality remains to be walked.

G. The Uyghur Genocide and the Persecution of Muslims in China

Numerous ongoing human rights violations by the Chinese government against Uyghurs, a Turkic-speaking Muslim group of 12 million people residing in Xinjiang, and other racial and religious minorities (Kazakh and Hui) in the same area of Xinjiang have been compared to acts of genocide. Uyghur historians view Uyghurs as the original inhabitants of Xinjiang, with a long history [33]. Over a million Turkic Muslims have been detained in internment camps [34] by the Chinese government since 2014 because of laws that were put into place without a fair trial. Between 2016 and 2021, the camps' operations dramatically expanded in both size and scope. Ethnic and religious minorities have seen the greatest amount of incarceration since World War II. This is a system of prison camps and workhouses supported by the state that tries to vilify and subjugate a particular ethnic community. According to estimations, in December 2020, 5-10% of detainees had died each year in the camps [35]. To keep the Muslim minorities of Xinjiang apart from the larger Han population, the Chinese government utilized nefarious advanced technical technologies, like face recognition software, DNA mappers, and smartphone tracking systems. According to experts, since 2017, there have been an estimated 16,000 mosques destroyed or damaged, and tens of thousands of kids have been taken away from their families and placed in boarding institutions.

Uyghurs have been arbitrarily imprisoned in state-sponsored internment camps, and government policies have included forced labor [36], political indoctrination, severe mistreatment [37], medical experimentation [38], organ harvesting [39], forced sterilization [40], forced contraception, and forced abortion [41]. According to statistics from the Chinese government, the birth rates in the primarily Uyghur districts of Hotan and Kashgar decreased by more than 60% between 2015 and 2018. The birth rate across the board fell by 9.69% during that time. In Xinjiang, birth rates decreased by over a third in 2018, although Chinese authorities disputed accusations of forced sterilization and genocide [42]. Xinjiang experienced a further 24% decline in birth rates in 2019 compared to a 4.2% national decline.

These measures have been labeled as genocide, ethnic cleansing, cultural genocide, forced assimilation of Xinjiang, and more. Article II of the Genocide Convention forbids "acts committed with intent to destroy, in whole or in part, a "racial or religious group," including "causing serious bodily harm or mental harm to members of the group" and "measures intended to prevent births within the group." Those who accuse China of genocide point to intentional actions taken by the Chinese government that they claim violate this provision.

H. The Darfur Genocide

The Darfur genocide in western Sudan, which is regarded as the first genocide of the twenty-first century, originated from the same sources as many other genocides: political and economic motives, a civil war between Christians, animist Black southerners, and the Arab-dominated government, and finally Arab racism. The BBC first covered the issue of ethnic cleansing in November 2003 [43]. The UN assessed in 2013 that the genocide had resulted in up to 300,000 deaths. By 2015, this increased to anywhere between 100,000 and 400,000 deaths. Over 3 million people's lives were affected, and millions of people were forced to flee their homes in Darfur as a result of the government's deployment of chemical weapons against the local populace in 2016. One million children have suffered from the genocide, including deaths, rapes, injuries, displacement, trauma, and family and parent loss. Rape [44] has also been used as a method of genocide, as has been highlighted. Sadly, kids were also implicated in this [45], [46].

I. The Persecution of Bahá'ís

The persecution of Bahá'ís has its roots in a variety of religious perspectives. In Qajar Persia in 1863, Bahá'u'lláh founded the Bahá' Faith. Eighty-nine percent of Iranians identify as Twelver Shia Muslims, whose central doctrine is the anticipated appearance of a messianic person known as the Qa'im or as the Imam Mahdi who is believed to have status equivalent to Muhammad [47]. Starting in the 20th century, centrally planned efforts that targeted the whole Bahá' community: more than 100 Bahá's

were killed in Yazd in 1903. Later, Bahá' marriages were not recognized, Bahá' schools like the Tarbiyat boys' and girls' schools in Tehran were shut down, and Bahá' literature was suppressed. Over the years, a lot of holy sites were destroyed, arbitrary confiscation of property was made, there were media attacks, denial of access to university education (intellectual cleansing), monitoring of activities, arrests or /and executions.

J. More atrocities

Even though all the historical traumata have not yet healed, massacres, sexual assault, torture, and detentions of Tigrayans are all commonplace in northern Ethiopia. In addition to the 500,000 deaths that have occurred because of the violence that started at the end of 2020, there is a pressing need for humanitarian help. Tigray has essentially been cut off from getting humanitarian relief or receiving necessities throughout the previous two years due to limited to non-existent access to money, gasoline, telephones, or electricity. The war has severely impacted families' lives and means of subsistence while also leaving many injured. Due to the conflict's recurrent spillover into the close-by districts of Afar and Amhara, the country's humanitarian needs in the north have significantly increased. The risk of additional epidemics, such as cholera, as well as diseases like cholera, measles, acute respiratory tract infections, and others, is also very high. Currently, more than 2.8 million people lack access to infrastructure for food, nutrition, health, water, and sanitation and are homeless and living in crowded situations. The conflict has wreaked havoc on maternal health facilities, and maternal mortality rates are high everywhere.

K. The War in Ukraine.

Unfortunately, a new war in Ukraine has added to the list. So far about 14 million people left their homes, about 140,000 buildings were destroyed, there are about 15,000 people missing, 54,132 people injured and 42,295 people dead. The material damage rises to 350 billion dollars. All numbers increase as days go by and the war is still there. It is sad that the humanity will have to undergo the consequences of another war on top of all others.

What does stigma do to people?

All the above-mentioned populations, victims of the historically embedded trauma, carry the stigma in their psyche: Most of the times it is the **public stigma** due to the negative, discriminatory attitudes that others have about their origin, caste, race, ethnicity, religious or other beliefs. Or it is the internalized **shame** that these people have about their own condition, the **self-stigma**. Having been abused, raped, deprived, exiled, and having received all other disrespectful behaviors against them, they may feel incompetent, unworthy and such with all relative diminishing decisions that follow such self-judgments and which in the majority lower people's self-esteem and self-efficacy. And finally, it is the **institutional stigma**, the stereotypes embodied in laws and other institutions, which lower opportunities, lead to unequal distribution of material resources, erase hope and optimism for development and that people will ever succeed at certain challenges or improve their situation and this may become the cause of low physical and mental health.

Erving Goffman was one of the first to define stigma. He described it as an "*attribute that is deeply discrediting.*" A discredited attribute which could be readily discernible, such as one's skin color, or hidden but nonetheless discreditable if revealed, such as one's political/ religious record or struggles with mental illness [48]. The stigmatized may be wary of interacting with those who do not share their stigma, and those who do not share a certain stigma may disparage, overcompensate for, or ignore stigmatized people, according to Goffman. Stigma, he argues, is a general aspect of social life that complicates everyday micro-level interactions.

Based on Goffman's work, Link and Phelan [49] define stigma as the co-occurrence of four processes: (1) labeling human differences; (2) stereotyping such differences; (3) separating those labeled from "us"; and (4) establishing a status of loss and discrimination against those labelled. Link and Phelan contributed to the understanding of how stigma is tied to fundamental sociological

problems about social construction, reproduction, and the effects of social inequality by integrating the role of power and discrimination in their definition of stigma. Especially connected to “tribal stigmas” which have more to do with processes of exploitation and dominance than they do with deviation from the norm [50]. Due to their work, the role of the legislation and institutional practices in maintaining stigmatization has been further researched on how such behaviors facilitate the isolation of stigmatized people from social networks, communities, labor markets, the law, and politics. Thus, stigma is now understood as both a cause and an effect: it legitimizes the exclusion of those who have been treated unfairly and, via this exclusion, legitimizes unfair perceptions. A vicious cycle [51].

In conclusion, stigma bears the mark of disgrace or infamy attached to a characteristic of an individual or a group and it is a social deficiency. It implies social disapproval and leads unfairly to discrimination against and exclusion of the community. Thus, stigmatization necessarily leads to violence, harassment, and abuse [52]. It leads to marginalization, socio-economic and legal, which then in turn leads to poor, social and/or, emotional well-being, involvement in risky situations and behaviors, which then eventually lead to poverty, sex work with all health hazards. Regarding the effects of stigma, studies in public health have looked at the role of stigma as a primary cause of population-level health disparities through a variety of mechanisms physical and mental sickness and death.

A lot of work remains to be done towards destigmatization and healing the many losses and traumas involved on micro, meso and macro level.

Stress

According to WHO, stress can be defined as *any type of change that causes physical, emotional, or psychological strain*, and stress is *our body's response to anything that requires attention or action* [53]. Selye [54] first used the term in physiological and biomedical research, defining it as **the non-specific response of the body to any noxious stimulus**. Later, the idea was further developed, giving rise to the terms "stress response" and "stressor," which refer to the stimulus that endangers homeostasis. The vagueness of the definition of stress has since been highlighted by several researchers. This is because all the activities of an organism directly or indirectly relate to the maintenance of homeostasis, and as a result, the element of the threat to homeostasis has become almost meaningless.

Levine and Ursin [55] emphasize the view that stress should be considered as **a process that includes the stimulus, the perceptual processing of this input and the behavioural and physiological output**.

According to Koolhaas et al. [56], stress **refers to the elements of uncontrollability and/or unpredictability of stimuli**, terms central in the definition of stressor. Apart from the qualitative aspects of both uncontrollability and unpredictability, the quantitative dimension of intensity is also significant.

All the historical trauma examples covered in this overview have intense stressors, making it extremely challenging to achieve stability by altering the set-points of homeostatic processes. It is demanding for the organism to adjust the controlled physiological variables through allostasis processes, and the adaptation capacities that are severely impacted by the stress are not always successful. Most of the time, such stressful events set off behaviors and physiological reactions that impair adaptive ability and ultimately result in maladaptive diseases as a result of an attempt to adapt to uncontrollable, life-threatening circumstances. The allostatic load is too severe to justify the cost of restoring homeostasis [57]. As a result of such changes over time, generations of people who are sensitive (and epigenetically affected) may experience increased sympathetic nervous system activity together with hypercortisolaemia, as is seen in depression, or hypocortisolaemia, or in PTSD. These changes also have a role in stress-related brain disorders. In general, the immunological, endocrine, and nervous systems are all affected.

The embodied brain [58] responds to stressful situations by activating numerous neural circuits in an effort to adapt. Corticotropin-releasing hormone (CRH) and vasopressin (AVP), two neuropeptides, are crucial for regulating the metabolic and behavioral reactions to stress. The HPA Axis, whose activity is reflected in corticosteroid hormone concentrations in the blood, is governed by the hypothalamic release of CRH and vasopressin. Every organ receives corticosteroids through the circulatory system, enabling the coordination of mental and physical processes aimed toward stress management, healing, and adaptation. Corticosteroids mobilize substrates for energy metabolism and inhibit initial immune and inflammatory responses to prevent them from overreacting to perform this vital life-sustaining role.

An increased risk of depression, belly obesity, osteoporosis, and cardiovascular issues are imposed by the incapacity to cope with life events, which causes the over secretion of corticosteroids [59]. According to estimates, 10–40% of people who have experienced severe trauma, such as the Holocaust, war, rape, abuse, go on to acquire PTSD and have significant depressive comorbidity [60]. These people have higher levels of CRH in their cerebrospinal fluid than depressed patients, but they also have lower plasma cortisol levels and increased pituitary sensitivity to dexamethasone's corticotropin-suppressing effects [61]. The hypothesis that "the onset of PTSD is facilitated by a failure to contain the biological stress response at the time of the trauma, resulting in a cascade of alterations that lead to intrusive recollections of the event, avoidance of the reminders of the event, and symptoms of hyperarousal" is supported by most psychological and biological data.

The Effect of Maternal Stress and The Foetal Brain.

The Development of the Cerebral Cortex

More than half of the human brain's volume is made up of the cerebral cortex, which is assumed to oversee the neuronal calculations behind complex processes including perception, cognition, language, attention, episodic memory, and voluntary movement. The human brain has more neurons, greater neuronal variety, and anatomical differences, expanded supragranular layers, and non-cortical structures like the cerebellum that enable trans-thalamic cortico-cortical connections, the connections between different regions of the cerebral cortex that involve thalamic pathways. The more complex human brain develops during a longer gestational period and has a more extended adolescence.

Several neurodevelopmental diseases that result from genetic or environmental damages to the developing brain should also be better understood and eventually treated with the use of knowledge about how human cortex development works.

It's crucial to understand that the cerebral cortex of most higher forms consists of six cell layers. Each layer has a unique organizational structure and set of connections. The cells initially leave the neural tube to form the deepest or sixth layer during the embryonic phase. Beyond the layer that was first set down, each subsequent migration ascends steadily and forms more superficial layers. Each group of migrating cells must therefore go through the layers that the earlier arrivals have already established.

The latter immigrant cells seem to follow the same cortical ladder-like radial glial guide cells as the earlier immigrants. Therefore, it is crucial that the earlier groups are successful in descending the glial ladder before the subsequent wave of immigrant cells tries to climb and pass through.

The following wave of cells ascending the ladder may not be able to pass without breaking their grasp if they don't do so. Developmental defects that result from this traffic jam could result in aberrant neural connections and disordered behavior.

The fact that each of these neurons is preprogrammed to travel to a certain location in the brain is now extremely significant. However, if there are excessive levels of stress hormones like cortisol, adrenaline, noradrenaline, or other pollutants in the blood, they will obstruct this traffic. As a result, if there is too much stress, too many stress hormones, thousands, possibly millions of neurons will be killed instead of getting to point A, if point A is the destination point. They may only go to point B, or point C, but they will never go to point A. As a result, you end up with a mis-wired brain.

It is crucial to understand that we have a mis-wired brain since it means the child will not have a normal brain from the moment of birth due to interference with the brain's hard wiring. This is in addition to all the other problems discussed when there is excessive stress during pregnancy.

Back to stress and stressors. In the above image, we see the adrenal gland. The small, triangular-shaped adrenal glands, also called suprarenal glands, are found on top of both kidneys. Our immune system, blood pressure, stress response, metabolism, and other critical processes are all controlled by hormones that are produced by our adrenal glands. The adrenal glands come from different embryological precursors and have distinct developmental paths. The intermediate mesoderm-derived adrenal cortex tissue first develops 33 days after conception, demonstrates the ability to produce steroid hormones by the eighth week, and experiences significant growth during the first trimester of pregnancy.

But what happens when the maternal environment faces stress?

Stress can suddenly raise blood pressure, put more strain on vein walls, and cause blood vessels to constrict. Blood flow to the surface portions of the body decreases when the stress response takes hold, while blood flow to the muscles, brain, legs, and arms increases, giving your muscles plenty of power and energy. However, it reduces blood flow to all internal organs, including the uterus. Therefore, a stressed-out pregnant woman's uterus receives less blood, which implies that her unborn child also receives less blood, fewer nutrients, and less oxygen. This deprives the unborn child of optimum development.

And what happens with **the APA Axis**? Imagine that you are pregnant, for instance, and that you are in a conflict zone with no idea where you will get your next meal. You constantly produce stress hormones while you are under a great deal of stress. Your amygdala will receive signals from your transitional cortex, which is where your ideas are located. The amygdala is telling the hypothalamus that something is wrong. The hippocampus, which under normal circumstances would put the brakes on the system when there is enough cortisone in the blood, will produce more cortisone when we are stressed, and because the hippocampus cannot override the amygdala, stressed pregnant women or anyone else who is under stress will experience these negative effects.

The Impact of Stress on Fetal Development

Stress exerts a profound influence on gene regulation in the developing fetus, manifesting in disruptions such as circuit miscreation and cell migration errors. Notably, excessive stress contributes to the loss of neurons and synapses, crucial points of neural connection. Adverse effects are particularly observed in the hippocampus and amygdala, impacting memory functions as neurons in these regions are compromised.

Furthermore, stress can disrupt the hypothalamic and reticular activating system, leading to disturbances in internal states, manifesting as sleep and eating difficulties. It hampers learning capabilities and inhibits dendritic branching, directly influencing cognitive capacity. The reduction in corticosteroid receptors in the brain heightens sensitivity, challenging the ability to cope with stress.

Contrary to the misconception that stress fosters strength, it primarily shapes character without contributing to genuine resilience. Analogous to a healed broken bone that never regains its original strength, the impact of stress on the brain is lasting. Serotonin levels, pivotal for mood regulation, decrease, inducing heightened irritability and a decline in overall brain weight. Elevated brain activity and an overcharged autonomic nervous system elevate health risks and accentuate aberrant personality traits. Moreover, stress compromises immune and inflammatory responses, escalating vulnerability to illnesses such as colds and cancer, while accelerating the demise of cerebellar neurons.

The Role of the Cerebellum in Cognitive Function and Emotional Balance

Initially perceived as primarily governing movement, the cerebellum, located at the posterior of the brain, now emerges as a multifaceted brain region influencing higher cognitive functions, including planning, reasoning, and decision-making, in addition to its established role in movement control. With a substantial concentration of neurons, the cerebellum significantly contributes to the clarity of thought, and any impairment in its functionality can detrimentally affect cognitive abilities [62].

Moreover, stress disrupts the delicate hormonal balance, inhibiting oxytocin, the "love hormone" pivotal for nurturing romantic bonds, and promoting the release of vasopressin, linked to aggressive behavior. Such hormonal imbalances during fetal development can result in feminization in males and masculinization in females.

Of equal importance, stress inhibits the prefrontal cortex, the epicenter of higher brain functions, favoring instinctual responses over intricate intellectual tasks. This inhibition facilitates the imprinting of emotionally charged memories, particularly those of a traumatic or toxic nature, originating in the amygdala. Stressful events during pregnancy are associated with congenital deformities such as cleft lip, cleft palate, and spina bifida.

The Nexus of Famine, Conflict, and Human Vulnerability due to Natural Disasters

According to Terry Cannon [63], the environment is a "social construction" The socio-economic structure causes some groups of people and some societies to be more vulnerable to dangers than others, even though Nature can present many hazards and challenges for humans. As a result, some societies are more vulnerable to dangers than others. According to Cannon, ... *disasters are not "natural" (not even sudden ones) because hazards affect people differently within societies and may have different impacts on different societies... These inequalities in risk and opportunity are largely a function of the principal systems of power operating in all societies, normally analysed in terms of class, gender and ethnicity... Thus, it is important to understand the relationship between humans and Nature and how human systems place people in relation to each other and to the environment.*

Famines often emerge as a grim aftermath of widespread civil upheaval and conflicts, transcending mere climatic factors to reveal a complex interplay of human actions. In many instances, famines are not solely products of insufficient rainfall but are, to a considerable extent, man-made. Human motivations, be they political, socioeconomic, or driven by other interests, often instigate civil unrest, wars, and genocides. Forced marginalization compounds these issues, pushing populations onto less fertile lands with limited resources, heightening vulnerability to environmental challenges like droughts.

Displacement from land and economic opportunities forces communities into flood-prone areas, perpetuating a cycle of hardship. Insufficient wages and limited educational access confine generations to substandard living conditions devoid of hygiene and healthcare. These disparities impact people's resilience and their ability to confront various threats, encompassing nutritional status, adaptability, and prospects for recovery.

The components of vulnerability are shaped by social dynamics such as class, gender, race, age, and state actions, irrespective of political motives. Yet, a pressing question persists: in the face of numerous genocides and wars fueled by political, religious, and economic power, how can concerted efforts be directed toward safeguarding the vulnerable victims?

Natural Disasters, Public Health, and Maternal Vulnerability

Natural disasters are an enduring global challenge, with the Emergency Event Database (EM-DAT) recording 432 natural hazard-related catastrophes in 2021 alone. While global fatalities and affected populations were lower than 20-year averages, the year witnessed a surge in disaster events and

substantial economic losses. Asia bore the brunt, experiencing 40% of all disasters, 49% of fatalities, and 66% of affected individuals [64].

Throughout history, natural disasters have exerted profound effects on population dynamics, health, and ways of life. These events lead to fatalities, severe injuries, increased susceptibility to diseases, damage to medical infrastructure, food shortages, and displacements. A comprehensive literature review on humanitarian emergencies underscores the multidimensional impact of natural catastrophes on public health.

Direct consequences include acute illnesses, physical trauma, and mental distress, with potential ramifications for the healthcare system, contributing to heightened morbidity and mortality from infectious and chronic diseases [65]. Pregnant women emerge as a vulnerable group during emergencies, experiencing physiological changes [66] that, when combined with disaster-related stress, elevate the risk of miscarriage, premature birth, and low birth weight [67]. Research, particularly in the aftermath of events like hurricanes Irma and Maria in Puerto Rico [69], emphasizes the stressors faced by pregnant women, ranging from access to essentials to concerns about their well-being. Among the findings are unanticipated caesareans and premature deliveries along with disruption of the electrical and communications networks causing problems to the health services.

Studies [70] also reveal adverse pregnancy outcomes associated with natural disasters, such as unplanned pregnancies, sexually transmitted infections, inadequate prenatal care, and congenital anomalies. Such findings show how the loss of access to essential services during an emergency may affect women who are pregnant or just gave birth in terms of their physical and mental well-being.

Puerto Rico's case exemplifies the intricate interplay of economic crises, poor infrastructure, corruption, and political status in exacerbating vulnerabilities during emergencies.

Research on the impact of hurricane Catarina on fetal and infant health in Brazil [71] underscores the significant effects on mothers aged 15 to 24. The findings include an 82g birth weight loss, a 3.4 percentage point increase in the likelihood of low birth weight, and a notable rise in fetal deaths. These insights illuminate the pervasive influence of natural disasters on maternal and child health, urging a holistic approach to disaster preparedness and response.

The Ice Storm in Quebec

As previously highlighted, the impact of stress on pregnant mothers is widely acknowledged, with prenatal maternal stress (PNMS) implicated in a heightened risk of adverse outcomes for the child, including birth defects and severe mental illness, as documented in retrospective epidemiological studies [72], [73], [74], [75], [76]. Although these studies have been limited, their numbers have increased in recent decades, offering valuable insights into the complex mechanisms underlying PNMS effects.

The ice storm in Quebec in 1998 stands as a pivotal event studied by S. King, D. Laplante, and their research team since 2008 [77]. Assessing 140 children, their investigation revealed a direct correlation between the degree of prenatal stress and toddlers' cognitive and motor development. Remarkably, even after eight and a half years, the average IQ difference remained stable at 15 points. Their findings emphasized that exposure to prenatal stress during pregnancy independently influences birth outcomes, with the timing of exposure, newborn sex, and stressor type moderating these effects [78]. This influential study suggested that the objective degree of exposure to the storm and maternal subjective distress exert enduring effects on child development: "Objective degree of exposure to the storm and the mothers' subjective distress have strong and persistent effects on child development, and that these effects are often moderated by the timing of the ice storm in pregnancy and by the child's sex" [79].

In their recent meta-analysis [80], King, Laplante, and colleagues demonstrated the significant impact of PNMS resulting from natural disasters on various facets of child development. These

encompass birth outcomes and cognitive, motor (affecting intellectual language and motor development), physical (increasing the risk for obesity, body mass index or diabetes, metabolic diseases, immune system issues, as well as egg and sperm health), socioemotional (elevated levels of anxiety and depression), and behavioral development. Several of these effects persisted into young adulthood and adolescence, underscoring the long-term implications. The researchers advocate for additional precautions for pregnant women and their unborn children during prolonged disasters affecting a broader population, suggesting that such measures could alleviate obstacles to recovery efforts in the aftermath.

Telomeres

Telomeres, the DNA-protein structures at chromosome ends, have emerged as disease mediators and biomarkers for persistent psychosocial stress. Extensive research has linked stress to telomerase activity changes and telomere shortening, unveiling transgenerational influences and interconnected molecular pathways as hallmarks of aging. The inheritance of short telomeres from parental germline, known as telotype transmission, and the impact of prenatal stress on fetal development further broaden our comprehension [81].

In both dividing and non-dividing cells, oxidative damage and end processing activities can lead to telomere shortening. Telomerase, a specialized enzyme preventing telomere attrition, plays a crucial role. Telomere shortening results in structural collapse, shelterin complex displacement, and dysfunctional telomeres, triggering DNA damage response, loss of cell proliferation, and senescence or death.

Several meta-analyses have established the relationship between various stressors and short telomere length [82], [83], [84]. Early life stress and depression exhibit significant correlations, with oxidative stress, a potent mediator of stress-related pathways, particularly impacting telomeres [85], [86]. Telomeres are particularly susceptible to oxidative damage [87], with over 50 conditions, including psychosocial stress and early life trauma, linked to telomeres.

Research indicates that witnessing violence leads to telomere shortening in children aged 5 to 15, reflecting accelerated cellular aging [88]. Moreover, father loss between ages 9 and birth reduces telomere length by approximately 16%, with a more pronounced impact in cases of paternal death [89]. These phenomena are notably prevalent in conflict zones.

Maternal depression

Maternal depression is a prevalent concern during pregnancy, with up to 50% of pregnant women experiencing serious depression, and 10–20% displaying depressive symptoms, potentially higher in conflict zones or areas with historical trauma. The impact of maternal depression on children manifests in unwanted parenting behaviors, such as non-response, inattentiveness, and ineffective discipline, linked to maternal depression and accompanying stressors like marital conflict [90]. Antenatal distress increases the likelihood of preterm birth [91], with 40% of maternal cortisol crossing the placenta [92]. Prenatal cortisol and norepinephrine levels, associated with fetal growth, mediate the effects of maternal depression on neonatal outcomes [93]. More severe maternal depression is correlated with a higher risk of preterm delivery [94]. These findings imply that the mother's prenatal biochemistry has moderating effects on the fetus's overall development [95].

Children of depressed mothers exhibit lower IQs (significant difference of 4.5 points), leading to increased needs for special education services, cognitive delays, and poor academic performance [96]. Depressed mothers are less likely to engage in face-to-face interactions, affecting child developmental domains [97], [98], [99]. Research in Chile revealed that extremely depressive mothers provided less emotional and material assistance to their children, leading to lower IQs [100]. The dynamic and lasting impacts of depression on parenting and child growth were evident, with depressed mothers'

behaviors influencing their children's emotional expressions and communication skills [98], [99]. Furthermore, the child of a depressed mother may appear "depressed" (examples include less talking, less touching, and more unpleasant facial expressions), as maternal behaviors like speech and affect can be imitated or passed on to the child [101], [102]. Importantly, a depressed mother may not acknowledge a kid's attempts at communication [103], and as a result, MDS-exposed children who have fewer mother-child contact are more likely to perform poorly in communication domains. Moreover, children exposed to maternal depression face a higher likelihood of engaging in violent behavior by age 16 [104]. The enduring effects of maternal depression on the brain architecture and stress response systems of children emphasize the importance of early intervention and support [81].

Maternal Depression's effect on the Newborn

Maternal depression symptoms during pregnancy are linked to newborn irritability, evident within 8 to 72 hours after delivery. The higher the mother's CES-D score, the more likely the newborn exhibits excessive crying and sleep disturbances [105]. Babies of depressed mothers experienced disrupted sleep patterns, with longer nocturnal sleep latency, shorter sleep episodes, and worse sleep efficiency persisting at 24 weeks. High-risk infants slept more during the day than low-risk infants at both 2 and 24 weeks, suggesting delayed consolidation of nocturnal sleep. High-risk infants also had increased daytime and nighttime sleep episodes, possibly due to frequent awakenings or an inability to maintain sleep [106].

Unfavorable neonatal symptoms, including respiratory distress, jaundice, convulsions, and feeding difficulties, were observed in infants of depressed mothers [107]. Reduced left frontal brain activity, associated with lower maternal attachment levels, was specific to newborns of depressive mothers. Elevated negative affect, antagonism, temper tantrums, and violence were linked to increased generalized frontal activity [108]. Changes in neonatal functional connectivity, especially fronto-parietal and temporo-parietal connectivity, may result from maternal depression during pregnancy. The strength of neonatal brain connections and autonomic system development may be affected by maternal prenatal depression, potentially leading to behavioral development issues influenced by fetal cortisol exposure [109].

Effect of Maternal stress on physical health of unborn child.

Peter W. Nathanielsz, a researcher and author at Cornell University [110], M.D., Ph.D., contends that a lifetime of poor health—spanning from coronary artery disease and stroke to obesity and diabetes—can originate from adverse conditions in the womb.

Various factors, including pregnancy complications, infections, and exposure to toxins, can negatively impact the normal growth of the unborn child. About half of all instances of low birth weight (LBW) and prematurity, along with their post-birth issues, are accounted for by known biological risk factors, such as maternal illnesses, teratogenic substances, pregnancy complications, nutritional inadequacies, and infections [111], [112]. Regardless of the underlying cause, LBW and prematurity can result in enduring impairments in an infant's behavioral and physiological development, posing a higher likelihood of developing asthma, allergies, reduced response to infection, lowered immunity at birth [113]. Furthermore, PTB and LBW offspring may encounter more severe health concerns requiring ongoing medical care from childhood into adulthood, including an increased susceptibility to mood disorders [114].

A significant portion of unexplained instances may be attributed to maternal stress and anxiety during pregnancy, as evidenced by recent well-conducted studies that consider medical and obstetric histories, lifestyle elements (including drinking and smoking habits), socioeconomic status, and the course of pregnancy and delivery [115], [116], [117]. Maternal stress, particularly in the first trimester or half of pregnancy, emerges as a robust predictor of poor newborn behavior, often linked with

pregnancy-specific concerns such as anxiety about the baby's health and fear of (pain during) delivery [115], [116], [117].

The research underscores that prenatal stress not only impacts the physical development of newborns, affecting variables like birth weight, head size, and anatomical anomalies, but also influences their functional development, manifesting as poor psychomotor performance and more challenging behavior during infancy and early years. Substance use during pregnancy, including alcohol, cocaine, and cigarettes, can adversely affect a child's structural and functional growth, potentially leading to lasting physical or mental disabilities.

Moreover, maternal stress experienced during pregnancy is associated with chronic diseases such as hypertension [118]. Significant stress around conception, like the death of a loved one or separation, increases a woman's risk of giving birth to a child with congenital heart defects, neural tube defects, or an isolated cleft lip [119]. Notably, early encounters with stressors, such as a loved one's death or a terrorist attack during pregnancy, elevate the likelihood of unfavorable outcomes, including pregnancy loss. Less severe forms of stress, such as perceived stress, pregnancy-specific distress, and anxiety, have a pronounced impact on raising the risk of having a baby with low birth weight (LBW) and preterm birth (PTB). Growing evidence implicates racial stress as a factor in the consistently higher incidence of LBW, infant death, and small-for-gestational-age newborns among African American women. The impact of stressors like racism, discrimination, and other life difficulties can be exacerbated by the cultural, social, and environmental setting in which they arise [120]. The cumulative findings across multiple studies suggest that prenatal stress can have enduring impacts, even in the absence of direct maternal stress, pointing to transgenerational implications of gestational stress [121], [122]. (Table 1 & Table 2)

Unveiling the Prenatal Origins of Cancer: From Embryonic Cells to Adult Malignancies

Cancer's inception is rooted in prenatal origins, where embryonic cells, equipped with rapid division capabilities, give rise to cancer stem cells (CSCs). These CSCs mirror embryonic cells in biochemical and molecular processes but lack the regulatory mechanisms preventing uncontrolled proliferation [123]. Adult stem cells and cancer cells can fuse to form CSCs, connecting malignancies to prenatal development. Conditions like neuroblastoma, TMD, leukemia, and other cancers emerge in utero, associated with resistant cells exhibiting disrupted cell death, numerical excess, and differentiation arrest during tissue ontogeny [124], [125]. The physio-pathological conditions of immune tolerance during embryo and tumor development further intertwine their trajectories [126].

Implantation Parallels: Cancer and Embryonic Cells

The zygote's implantation stage stands as a crucial juncture, shared by embryonic cells and cancer cells. Murray et al. propose that cancer cells employ similar machinery as embryos for tumor implantation [127]. Cancer cells activate repressive pathways against the immune system, akin to embryonic cells. Trophoblasts, crucial for maternal immune suppression during embryo development, share pathways and behavior with cancer cells [128]. Fukuda et al. identify trophinin as a protein utilized by both embryonic and cancer cells for adhesion, emphasizing the striking parallels in behavior [129]. As cancer cells mimic invasive placental cells, their early phases intertwine with embryogenesis, notably in the expression of genes maintaining stem cell-like characteristics [130], [131].

Aging's Genesis: Environmental Impacts during Fetal Development

Aging's genesis traces back to conception, where inherited genomes set the stage for a lifelong trajectory. Environmental factors during fetal development and early postnatal years shape organs, influencing susceptibility to age-related decline [132]. Human life path strategies evolve early, and aging is a component of these adaptive responses [133]. Developmental plasticity, arising from early-life experiences, influences gene expression alterations. The embryonic phase witnesses substantial differentiation, followed by the fetal period's rapid growth and organ sensitivity to environmental signals [134]. While some tissues maintain a limited capacity for renewal through stem cells, developmental processes impact their later renewal potential, with plasticity diminishing as functional capacity solidifies in later life [135].

Prenatal Influences on Long-Term Health: From Pre-eclampsia to Chronic Diseases

Pre-eclampsia, as noted by Redman and Sargent [136], heightens oxidative stress markers and induces placental vascular dysfunction, resulting in immediate and enduring impacts on offspring. Adult hypertension, stroke, diabetes, and obesity are among the long-term consequences [137], [138]. Maternal obesity and overeating further disturb redox balance in children, contributing to enduring cardiovascular repercussions [139].

The Cascade of Effects: From Placental Oxidative Stress to Insulin Resistance

Insulin resistance and elevated oxidative stress persist into prepubescent life alongside maternal obesity or gestational diabetes [140], [141]. Placental reactive oxygen species elevation, triggered by maternal conditions, correlates with newborn insulin resistance and obesity [142], [143]. Early environmental factors extend their influence to peak bone mass development, with connections between adult bone mass, infant weight, and birth weight identified [144].

Birth Weight and Muscle Fiber Dynamics: A Lifelong Impact

Birth weight intertwines with muscle fiber number and types, set at birth, influencing muscle development into middle age [145]. Prenatal and childhood factors, encompassing fetal nutrition and family socioeconomic status, influence a pro-inflammatory trajectory, potentially culminating in age-related illnesses in later life [146], [147], [148], [149]. Inflammatory reactions throughout the lifespan become triggers when homeostatic mechanisms, like endocrine axes, falter. Chronic inflammatory responses can alter metabolic set points, leading to increased insulin resistance and a spectrum of diseases [150].

Inflammatory Responses, Longevity, and Developmental Plasticity

Early life impacts on longevity tied to the season of birth encompass dietary and epigenetic components, as per Moore et al. [151]. Inflammatory responses significantly shape an individual's developmental plasticity, predisposing them to chronic diseases in later life. The interplay of life course history, environment, and socioeconomic resources can override homeostatic mechanisms, shifting metabolic set points [151]. As Nathanielsz aptly summarizes, "How we are ushered into life determines how we leave."

Excessive and sustained stress may predispose to

- low birth rate
- prematurity,
- congenital malformations: cleft lip, cleft palate and spina bifida)
- SIDS, serotonin defects in the brain stem
- heart disease
- hypertension
- cancer.
- dyslipidaemia
- osteoporosis
- type 2, diabetes
- susceptibility to seizures.
- inhibition of the immune system.
- decreased ability to deal with stress
- premature aging.
- exhaustion of the adrenals, which leads to decrease cortisol, which then leads to overcharged immune system, which may in turn, provide all kinds of new diseases such as
 - rheumatoid arthritis.
 - multiple sclerosis
 - fibromyalgia,
 - chronic fatigue syndrome
- increased rate of miscarriage.
- increased rate of stillbirth

Table 1

Prenatal Programming: Nurturing a Lifelong Impact on Mental Health

Understanding how genes and the environment interact is pivotal to comprehending an organism's functioning. The fetus, with its rapid growth rates, is particularly susceptible to alterations in its hormonal environment, prompting the hypothesis that a pregnant woman's stressful life events and responses may shape the fetal environment, influencing the child's physical and mental health.

Several studies have linked maternal stress or prenatal anxiety to a spectrum of developmental challenges, encompassing emotional issues, hyperactivity, attention deficits [152], [153], [154], Tourette's syndrome [155], schizophrenia, and other psychopathologies [156], [157], [158]. Prenatal stress has been correlated with autistic traits in children [160], [161]. These adaptive traits in challenging environments suggest that prenatal programming readies the child or group for their circumstances. For instance, heightened alertness may connect to anxiety, distractible attention to increased perceptions of danger, impulsivity to increased exploration, and aggression to enhanced defense capacities [162].

Maternal stress during gestation leaves enduring imprints on the developing brain, particularly in the amygdala, crucial for emotion processing and developing during the early embryonic stage [163]. Stress induces alterations in the amygdala's neurotransmission system, affecting GABA receptor adaptation, GABAergic inhibition, and synaptic neurotransmission. Persistent amygdala hyperactivity raises susceptibility to stress-related neuropsychiatric disorders [164]. Impaired fear recognition, observed in those with amygdala damage and adults with psychopathy, contributes to a range of challenges, including risk-taking behaviors, an inability to learn from mistakes, and a lack of empathy.

These difficulties, manifesting early in children with psychopathic traits, underscore the importance of intervening during developmentally sensitive periods [165].

Chronic diseases associated with the Fetal Origins of Adult Disease (FOAD) hypothesis.

Diabetes Mellitus

Obesity

Dyslipidemia

Hypertension Coronary Artery Disease

Stroke

Kidney Failure – glomerulosclerosis

Liver Failure – cholestasis, steatosis

Lung Abnormalities – BPD, reactive airway disease

Immune Dysfunction

Reduced Bone Mass

Alzheimer's Disease

Depression, Anxiety, Bipolar Disorder, Schizophrenia

Cancer

Table 2

The Ravages of War: Impact on Child Development and Public Health

War exacts a devastating toll on children, with six grave violations against them outlined by UNICEF, including killing, recruitment, attacks on schools, sexual violence, abduction, and denial of humanitarian access [166]. Children born in conflict zones often exhibit significant developmental delays and regressive, non-affiliative behavior [167]. Shockingly, a child born to a pregnant woman in a conflict area has an elevated risk of developing schizophrenia, as evidenced by a study during the Arab-Israeli War [168].

Immediate and Long-Term Public Health Consequences

The repercussions of war extend beyond mental impacts like PTSD to encompass death, injury, sexual violence, hunger, disease, and disability. The severity of trauma and the availability of support influence prevalence rates, impacting populations at all life stages. Children, in particular, bear the brunt of war's lasting effects, affecting infancy, early childhood, and beyond.

Health Disparities and Orphanhood

Children exposed to war face heightened probabilities of mortality in infancy and orphanhood [169] [170], [171], [172]. Limited access to mental health resources in war zones exposes these children to a range of mental health problems, including PTSD, depression, anxiety, and behavioral issues, often challenging to treat [173], [174], [175]. Exposure to war disrupts children's entitlement to early childhood education and healthy development, contributing to institutionalization [176].

Toxic Stress and Lifelong Impacts

Toxic stress, resulting from prolonged adversity without adequate adult support, can impede brain and organ development, promote psychopathology, and worsen cognitive and emotional impairment. The effects persist into adulthood, underscoring the importance of early detection and evidence-based treatment for severe psychopathology [178] [179], [180], [181].

Conflict-Induced Hunger and Malnutrition

War and conflict are closely linked to hunger, with ten of the world's worst food crises fueled by conflict. Over 60% of those at risk of famine reside in conflict zones, and children in these areas are more than twice as likely to be malnourished [182]. Malnutrition is not confined to children; maternal malnutrition, particularly when coupled with suboptimal breastfeeding habits, contributes to mortality and disease burden for both mothers and infants. Stunting, severe wasting, and intrauterine growth restriction collectively result in 2.2 million deaths and 21% of DALYs for children under five [183]. Malnutrition-related factors jointly account for approximately 35% of child fatalities and 11% of the global illness burden.

Legacy of Starvation: Dutch Famine and Leningrad Siege

Two harrowing episodes, the **Dutch famine** and the **Leningrad siege**, serve as poignant reminders of the profound impact of war on civilian populations. The Dutch Hunger Winter unfolded in the waning days of World War II when the Nazis severed food supplies to the western Netherlands. Lasting from November 1944 to May 1945, the famine claimed around 20,000 lives, and 4.5 million people suffered its effects. Enduring daily rations of 400–800 calories, coupled with a harsh winter, poor crops, and four years of relentless warfare, the populace resorted to desperate measures such as consuming grass and tulip bulbs for survival.

On the Eastern Front of World War II, the Leningrad siege stands as one of history's most devastating and protracted blockades. Initiated by the Wehrmacht on September 8, 1941, the city remained cut off until January 27, 1944, lasting a staggering 872 days. Regarded by some historians as a genocide due to systematic starvation and deliberate eradication of civilians, the siege left an indelible mark on the city's population.

The "Mismatch Concept" and Long-Term Health Implications

Researchers [184] studying these events introduced the "**mismatch concept**," examining how the intrauterine environment's stress during famine or siege influenced the adaptation of foetuses to their later existence. Leningrad siege survivors exhibited a "**thrifty phenotype**," where their intrauterine adaptation matched the malnutrition experienced outside the womb, potentially offering protection from later adult diseases. In contrast, Dutch foetuses displayed compensatory growth, adapting to the harsh intrauterine environment but facing challenges in their dissimilar postnatal conditions.

Body's Memories: Translating Undernutrition to Pathology

The impact of early undernutrition leaves an enduring imprint on the body, translating into pathology and influencing diseases such as hypertension, diabetes, and cardiovascular diseases in later life [117]. The study of these historical events underscores the critical importance of ensuring both physical and mental support to individuals facing such adversities.

Cold Homes: A Winter Crisis in War and Conflict Areas

War and conflict areas face additional challenges during winter, including resource shortages and fuel poverty. Living in cold homes poses severe risks, damaging children's lung and brain development and contributing to a "significant humanitarian crisis." Research indicates a surge in respiratory illnesses with long-term effects among children in these regions. The damage to developing lungs could manifest as chronic conditions like chronic obstructive pulmonary disease (COPD), emphysema, or bronchitis in adulthood [185].

Breathe at Your Own Risk: Air Pollution's Silent Assault

Air pollution, a ubiquitous byproduct of modern life, but also war, emerges as a silent assailant, impacting both immediate and long-term health. Fine particulate matter, measuring 2.5 microns or less, infiltrates the circulatory system, creating a global health crisis associated with diseases and premature death.

Exposure to polluted air during pregnancy isn't just a concern for the immediate health of mothers; it has far-reaching consequences for the cardiovascular health of the next generation [186], [187]. Astonishingly, a mere two-hour exposure to diesel exhaust fumes can induce fundamental changes in biological processes, flipping genes on and off. Diesel exhaust, a notorious contributor to air pollution, triggers alterations in DNA methylation at approximately 2,800 points, affecting around 400 genes. These changes occur even in the absence of outward signs, emphasizing the vulnerability of our genetic infrastructure to the insidious influence of air pollution [188].

Cognitive Costs: Air Pollution's Impact on IQ and Neurodevelopment

Prenatal exposure to air pollution isn't merely a matter of physical health; it extends its malevolent reach to the cognitive domain. Research has uncovered a concerning correlation between prenatal air pollution and a child's IQ score [189]. The repercussions on neurodevelopment are profound, contributing to emotional dysregulation, diminished cognitive development [190], and an increased likelihood of behavioral issues [191]. Disorders like Autism Spectrum Disorder (ASD) and Attention Deficit/Hyperactivity Disorder (ADHD) [192] may also find roots in prenatal exposure to air pollution. Toxicologic studies delve into the intricate molecular processes at play, involving heightened microglial activation, oxidative stress, neuroinflammation, and disruptions to epigenetic programming. These processes provide a comprehensive explanation for the neurodevelopmental toxicity inflicted by air pollution [193].

As we grapple with the pervasive influence of air pollution, it becomes imperative to recognize its multi-faceted assault on human health, transcending the boundaries of physical well-being and encroaching upon the very fabric of cognitive development and future potential.

Wielding Destruction: Unveiling the Toxic Legacy of Modern Warfare Weapons

In the grim theater of modern warfare, the arsenal extends beyond conventional weapons, venturing into the realm of mass destruction that recognizes no borders. Biological, chemical, nuclear, and radiological agents wielded in bombs, warheads, grenades, mines, missiles, and ammunition pose a profound threat, leaving behind a toxic legacy that defies generations [194].

The haunting shadows of atomic warfare linger far beyond the blast, as evidenced by the aftermath of the atomic bomb dropped on Nagasaki during World War II. Prenatal exposure to the radiation unleashed by this devastating event has been linked to the emergence of schizophrenia and other psychopathologies later in life [195]. The scars of war, written in atomic fallout, transcend physical injuries to impact the very fabric of mental well-being.

Lead Bullets: Silent Menace in Modern Hunting

While the toxicity of lead has been understood for centuries, the use of lead ammunition for hunting and shooting poses an insidious threat. Lead dust from firearms not only endangers those who wield these weapons but also leaves a toxic imprint on victims. The devastating effects of lead toxicity encompass virtually every facet of the human body, disrupting the digestive, nervous, respiratory, and reproductive systems. Enzymes are crippled, DNA transcription falters, and bones bear the brunt of lead-induced disability. Even at low levels, chronic exposure to lead elevates the risk of cardiovascular diseases, chronic kidney ailments [197], and hampers neurodevelopment, impeding cognitive and behavioral growth in fetuses and young children [198].

Bullet's Echo: Lead Contamination Beyond the Shot

Lead-based bullets, a common choice in hunting, fracture within game animals, leaving a trail of contamination that extends to the entire carcass [199]. The ramifications reach unsuspecting consumers, with tens of thousands of children in the EU potentially consuming game tainted with lead-derived from ammunition. The consequences loom large, threatening cognitive development and casting a long shadow on the health of future generations.

As the harrowing impact of modern warfare's toxic weaponry unfolds, it becomes imperative to recognize the insidious repercussions that extend far beyond the battlefield, affecting the health and well-being of populations across borders.

Unseen Scars: The Devastating Impact of Domestic Violence during Pregnancy

In the supposed haven of home, where safety is expected, a silent epidemic unfolds—domestic violence against women, casting its dark shadow across socioeconomic strata, small households, and even during the vulnerable period of pregnancy [200]. Pregnancy, far from being a shield, seems unable to confer immunity to the scourge of domestic abuse, putting both mother and child at grave risk, even unto death.

A stark reality emerges from the evidence: women, particularly those in lower socioeconomic tiers, face an increased likelihood of abuse during pregnancy and the postpartum period [201]. The intersecting forces of intimate partner violence and residing in high-crime, violent neighborhoods disproportionately affect poor [202], less educated, and minority women, often leading to hospital admissions for assault during pregnancy. The toll is palpable—severe violence during pregnancy results in a significant reduction in birth weight, underscoring the dire consequences for both maternal and fetal health [203].

Hidden Wounds: Direct and Indirect Impacts of Violence

Violence exacts a toll beyond the visible scars, causing direct repercussions on maternal health—abruptio placentae, fetal fractures, uterine rupture, and antepartum hemorrhage. Yet, it is the insidious indirect effects that weave a complex tapestry of harm. Aggravation of chronic conditions like hypertension, diabetes, or asthma poses a threat to the fetus. Increased stress, limited access to prenatal care, behavioral hazards such as smoking, and inadequate nutrition further compound the risks for mothers [204].

The Generational Echo: Trauma's Legacy on Newborns

Negligent parenting, a product of maternal trauma symptoms, resonates in newborns, manifesting as re-experiencing, avoidance/numbing, and withdrawal [205][206]. Victims of violence find themselves in a harrowing cycle—bereft of autonomy, plagued by helplessness and malnutrition, and lacking control over essential resources for self-care and child-rearing. The emotional toxicity within

these women becomes a perilous environment for unborn children, sowing seeds of dysfunction and disease. Tragically, children born to abused pregnant mothers often face a perilous journey, marked by compromised health at birth, and in some heartbreaking instances, succumb to miscarriage or infant mortality [207].

As history unfolds, the specter of violence against women persists, drawing attention to the profound impact on humanity. Beyond individual suffering, it becomes a tool wielded to shape the destiny of descendants, drawing attention to the historical trauma that women endure. In the poignant words of Grigori Brekhman [208], *"Any violence against women is violence against humanity,"* urging a collective effort to break the chains of this enduring injustice.

Epigenetics: The Symphony of Gene Orchestration

In the intricate dance of heredity, a silent maestro directs the symphony of gene orchestration—epigenetics. This realm transcends the genetic code, intricately influencing the destiny of generations.

Resting just beyond the genome, the epigenome, symbolized by the Greek prefix "epi-" meaning "on," encompasses the switches guiding genes to wakefulness or slumber. Environmental cues, such as prenatal diet, stress, and maternal behavior, etch their mark through epigenetic switches, perpetuating effects from one generation to the next.

Dynamic Changes: Three Pillars of Epigenetic Alterations

Epigenetic changes unfold in three main forms: DNA methylation, Coding and non-coding RNA, and Histone modification. Methyl groups, the quintessential epigenetic tags, silence genes by hindering protein adherence. Non-coding RNA, a conductor of genetic expression, orchestrates the turning "on" or "off" of genes. Histones, wrapped around DNA, undergo modifications like acetylation, determining gene accessibility for transcriptional factors.

Methyl groups, the choreographers of this molecular dance, add and remove themselves, orchestrating a symphony of gene regulation. Although these groups may cement their positions during embryonic development, they exhibit a fluidity influenced by various factors, shaping our genetic destiny throughout life [209].

Our DNA serves as the blueprint for both coding and non-coding RNA. While coding RNA gives rise to proteins, non-coding RNA partners with proteins to regulate gene expression. This intricate ballet of molecules extends beyond protein coding, impacting biological processes and disease pathogenesis [210].

Wrapped around DNA, histones wield a crucial baton in the symphony. Histone acetylation renders genes accessible, while deacetylation closes the curtain. Adding or removing chemical groups from histones, like a crescendo or decrescendo, dictates gene activity, underscoring their pivotal role in gene regulation [211].

Research delves into the surprising role of histones in heredity. Studies altering histone molecular information during sperm cell development reveal enduring effects on children's survival and development, echoing through two generations. This insight illuminates the far-reaching impact of paternal lifestyle on offspring health, emphasizing the critical role fathers play in shaping their children's and grandchildren's well-being [212], [213], [214].

Prions, unconventional yet powerful agents in the epigenetic realm, influence traits through protein folding, challenging the traditional nucleic acid-centric view. These molecular mavericks respond keenly to environmental stress [215], linking extreme conditions with the acquisition and inheritance of new features.

Intriguingly, miRNA from sperm emerges as a transgenerational messenger. Male mice exposed to chronic social instability stress transmit stress-related behaviors to female offspring across three

generations, unveiling a potential biomarker for early maltreatment and susceptibility to psychiatric disorders in humans.

The symphony of epigenetics underscores a profound truth—genes do not dictate destiny. Rather, our way of life, environmental influences on our minds, and our body's response to these stimuli intricately shape the destiny encoded within our genes. In this dynamic interplay, the silent maestro of epigenetics weaves the tapestry of inheritance, transcending the confines of DNA.

Trauma's Silent Echo: The Legacy Across Generations

In the late 1970s and early 1980s, a revolutionary idea took root among scientists—an idea that transcended the boundaries of individual experience to encompass the transgenerational transmission of trauma. The narrative gained depth through controlled studies on Holocaust survivors' adult children from the mid-1980s onward. These studies uncovered a poignant tapestry of consequences, revealing heightened susceptibility to PTSD, an inherent mistrust of the world, diminished parental function, chronic sorrow, impaired emotional communication, persistent fear, separation anxiety, boundary issues, and a spectrum of psychiatric disorders.

Those gestating during times of famine faced a heightened risk of heart disease, schizophrenia, and type 2 diabetes [216]. Six decades after the famine's end, researchers scrutinized the methylation levels in individuals whose mothers carried them during the famine. In a poignant dance of genes, these individuals exhibited heightened methylation at certain genes and diminished methylation at others compared to their unexposed siblings, potentially explaining their elevated risk of specific diseases in later life [217], [218], [219], [220].

A distinct exploration into the legacy of Holocaust survivors delved into the intricate interplay between teenagers' attachment styles, self-perception, and the parents' Holocaust experiences. This intergenerational transmission manifested through mediating parenting factors, leaving an epigenetic mark akin to the indelible numbers tattooed on their parents' forearms [221]. As Natan Kellermann poignantly articulates, the children of Holocaust survivors bear an epigenetic imprint, a chemical coating on their chromosomes, a biological memory etched with their parents' experiences [222].

Further revelations by Yehuda et al. underscore the profound nature of this epigenetic inheritance, revealing methylation changes on the same site in the FKBP5 gene for both Holocaust survivors and their offspring [223]. This association stands as a testament to the enduring impact of preconception stress, linking generations through shared epigenetic changes in adult humans.

Unresolved childhood trauma casts a long shadow, elevating the risk for lifestyle diseases and entwining individuals in the criminal justice system as adults. This legacy encompasses the highest rates of suicide, alcoholism, poverty, and unemployment, all intricately linked to subpar child neurodevelopmental outcomes. The cycle of abuse perseveres across many generations until a decisive interruption occurs.

Much like the genetic features parents pass down, they also transmit acquired or epigenetic traits, especially those etched by highly emotional events like starvation, hostility, or profound loss. These traumatic experiences inscribe a lasting mark on the genetic material within germ cells, echoing through the offspring and generations yet unborn.

Olfactory Imprints: A Fragrance of Transgenerational Impact

In the intricate dance of survival, organisms sculpt their responses to environmental cues, a symphony orchestrated by changes in the composition and operation of the nervous system. An often-overlooked facet of this symphony is the parental exposure to critical environmental cues before the conception of their progeny—an invaluable yet understated influence on adult neurological systems. The possibility of transferring environmental information to offspring not yet conceived opens a realm

where parents can, in essence, "educate" their progeny about the significance of forthcoming environmental elements. Exploring the uncharted territory of when and how a parent's olfactory experience might ripple through generations, scientists embarked on a journey of olfactory fear conditioning [224].

In this experimental odyssey, male lab mice were subjected to electric shocks paired with the scent of acetophenone, a fragrance element found in perfumes. The repercussions were profound—the mice, conditioned to associate the smell with danger, exhibited heightened anxiety merely at the whiff of acetophenone. Unveiling the intricacies beneath, the mice's noses and brains underwent transformations, birthing more M71 neurons—cells finely attuned to this specific odor, rendering them hypersensitive to its presence. Astonishingly, this heightened sensitivity transcended generations, imprinting fear of the scent not only in their immediate offspring but echoing through to their grandkids. What unfolded was a multi-generational symphony of fear, conducted not only at the behavioral level but also etched in neuroanatomy and echoing the concept of "transgenerational epigenetic inheritance" [225].

This groundbreaking study shatters preconceptions, offering a paradigm for understanding how environmental information traverses generations, leaving imprints on behavior, neuroanatomy, and epigenetics. The profound revelation lies not just in the transmission of behavioral cues of fear and anxiety but in the transmission of altered brain chemistry, weaving a narrative of transgenerational impact. These findings, distinct from socially learned habits, delve into uncharted realms, unraveling the mystery behind phobias, fears, and anxieties, offering a fresh perspective on their origins.

Generational Echoes of Stress: Unraveling Maternal Imprints

In the scientific tapestry spun by researchers from the University of Lethbridge in Canada, interwoven with insights from a University of Alberta medical researcher, the impact of stress reverberates across generations of rats, echoing through the intricate dance of prenatal experiences [226].

The study unfolded across four generations, revealing that a solitary exposure to prenatal stress in one generation wielded a far-reaching influence, casting shadows over subsequent generations. The consequences were multi-faceted, painting a canvas that depicted heightened risks of preterm delivery, metabolic perturbations, endocrine imbalances, and behavioral nuances. Yet, the saga did not end there; a recurring theme emerged as repeated prenatal stress, etched over generations, heightened the responsiveness of the Hypothalamic-Pituitary-Adrenal (HPA) axis [226].

The chronicles of stress inscribed a tale of diminishing gestational duration, maternal weight gain, and behavioral activity. Simultaneously, blood sugar levels ascended, a rhythmic symphony of change that resonated up to the F2 generation. As the curtain of the study lifted, the stressed cohort showcased a panorama of reduced offspring growth and delayed behavioral development, with the crescendo echoing loudest in the F3 offspring of mothers burdened by transgenerational stress. A twist in the narrative unfolded in the molecular realms, where stress orchestrated a dance with the miR-200 family—gatekeepers of pathways orchestrating parturition and brain plasticity.

The uterine and cerebral landscapes of F2 females bore the imprints of stress, altering the expression of the miR-200 family. Downstream, Stat5b, Zeb1, and Zeb2, primary targets of the miR-200 family in the uterus, witnessed downregulation in the F1 generation, a resonating consequence of multigenerational stress. In the F2 generation ensnared by stress, Zeb2 echoed the symphony of reduction, unveiling a potential causative pathway for the disruption in pregnancy maintenance. Through this intricate dance of molecules, a family's history of stress seemed to script the central and peripheral pathways orchestrating gestational duration, maternal well-being, and the health outcomes of the progeny [227].

The study, like an eloquent saga, leaves us contemplating the silent echoes of stress that traverse through generations, shaping the destinies of maternal lines.

Paternal Transference of the Weight of Trauma

The symphony of trauma extends its tendrils not only through the experiences of the present generation but resonates across time, weaving its narrative through the progeny. In the intricate dance of paternal inheritance, offspring of defeated fathers emerge as the protagonists, bearing the burden of heightened depressive and anxiety-like behaviors in both genders [228]. The male descendants, in particular, wear the mantle of elevated baseline plasma corticosterone levels and diminished VEGF, painting a somber picture that echoes the stress imprinted on their fathers.

The genetic legacy is not spared, as sperm quality and fertility of men intertwine with the dance of miR449 and miR-34 families of sperm. In the shadow of stress, these genetic orchestrators sway, influencing the behavioral and metabolic landscape not only in those directly exposed to trauma but casting a long shadow across two subsequent generations [229], [230]. The interplay of parental stress during the formative years of a child unfurls as a complex epigenetic ballet, leaving a mark on the genome that resonates more than a decade later, inscribed in the methylation levels on numerous DNA sites [231].

As the research tapestry expands, the nuanced understanding of how human experiences, especially those steeped in historical trauma, cascade through generations deepens. The transference of suffering becomes not only a genetic inheritance but an epigenetic legacy, deeply intertwined with the fabric of emotional events like famine, violence, and profound loss [232]. The descendants, in their diverse lineages—children, grandchildren, and those yet unborn—bear witness to the echo of ancestral suffering. Pleasurable moments, viewed through the prism of inherited trauma, can morph into a betrayal of the past.

In the echo chambers of trauma, the body becomes a repository of memories, holding the imprints of past experiences that resonate through touch, scent, sound, and even the patterns of weather. Chronic trauma transforms into a body memory, triggering emergency reactions in response to reminders, reactions once essential for survival but now anachronistic [232].

Aharon Appelfeld, in the eloquent prose of his autobiography, echoes the sentiment: "Everything that transpired at the time has left its imprint on my body's cells... The cells of the body appear to recall better than the memory that is designed for this purpose..." [233]. The battlefield becomes embedded in the very fibers of being, and the journey through life carries the weight of ancestral struggle.

In this interplay of trauma and legacy, it becomes evident that abuse, unless the cycle is broken, perpetuates itself through the annals of time.

Healing the Legacy of Trauma: A Global Endeavor

Embarking on the journey to heal historical, collective, and intergenerational trauma is an intricate task, resonating as one of the most formidable projects of our era. This trauma, entwined in the very fabric of our DNA and shaped by environmental influences, unfolds its narrative across generations—a phenomenon illuminated by the burgeoning field of epigenetics. The profound impact of collective trauma reverberates through time, reaching as far as 14 generations genetically, leaving an indelible mark on the descendants [232].

In the crucible of history, where the echoes of slavery, castration, rape, discrimination, genocides, and myriad atrocities linger, the wounds of humanity run deep. Even those who did not witness these harrowing events firsthand carry the weight of altered DNA, manifesting in the insidious forms of PTSD, anxiety, depression, and other illnesses. The Holocaust, with its unspeakable horrors, stands as a

stark example—a testament to how the trauma of one generation can cascade through time, imprinting itself on the genetic code of descendants who were not physically present at the scene.

The annals of our history narrate tales of Native American genocide, where entire tribes were erased, cultures forever changed, and the echoes of colonization reverberate in lost territories, languages, religions, and traditions. The scars of imported diseases, epidemics, boarding school horrors, and the dehumanization of native populations through torture and experimentation linger. The violation of egalitarian ideologies and human rights becomes a recurring motif, as power games for resources, authority, and wealth play out in cycles of fear, ethnic cleansing, misinterpretations of spiritual teachings, and the propagation of propaganda and fanaticism.

To transcend the shackles of a supremacy culture and embrace the richness of diversity becomes a project demanding immediate attention. Yet, the challenge lies not only in individual attitudes but in the seismic shift required on a global scale. Political intentions and decisions at the international level become imperative, as breaking free from deeply ingrained patterns necessitates a collective effort of unprecedented magnitude.

Creating a peaceful reality, where all beings are treated with appreciation and respect, demands a departure from the cycles of destruction and a commitment to fostering an inclusive, harmonious world. This endeavor, colossal in scope, calls for a global paradigm shift—a shift that surpasses boundaries, transcends cultural divides, and paves the way for a shared vision of unity and understanding.

Holistic Approaches to Healing Collective Trauma

The healing of historical, collective, and intergenerational trauma is a multifaceted endeavor, requiring concerted efforts across various dimensions:

(a) **Education and Historical Narratives:** Understanding the profound impact and grief-related effects of traumatic history is a crucial starting point. Urgent measures include rewriting history books to reflect diverse perspectives and telling alternative stories that acknowledge the complexities of our shared past.

(b) **Sharing and Cathartic Relief:** Traditional settings provide spaces for sharing the effects of historical trauma, offering cathartic relief. Initiating discussions and dialogues within communities allows for a collective acknowledgment of pain and fosters understanding among individuals.

(c) **Bereavement, Loss, and Grief Resolution:** A structured approach to grief resolution is essential. This involves decreasing grief effects, cultivating a more positive identity, and fostering a commitment to individual and community healing [234]. Addressing ongoing grief, restoring self-community and human-ecological relationships, and generating cultural vibrancy become integral to global projects across all age groups and populations, spanning educational institutions, communities, organizations, and social structures [235].

(d) **Quantum-Holographic and Trans-generational Implications:** Exploring the potential for healing and holistic psychosomatic transformation rooted in the principles of quantum physics holds promise. The International Journal of Prenatal and Life Sciences delves into the quantum-holographic and trans-generational implications for child development, providing avenues for transformative healing [236], [237], [238], [239].

(e) **Somatics and Psychic Healing:** Traumas, whether physical or psychological, are stored in the body. Healthcare professionals, including osteopaths, chiropractors, craniosacral therapists, and massage therapists, recognize that trauma can create localized, compressed areas of disorganized energy. These areas, when addressed, may liberate traumatic memories and alleviate ongoing pain. However, recognizing the psychic burden of historical trauma is equally crucial. Deep psychic wounds demand healing, and efforts on the cellular level must align with the recognition of psychological scars [240].

(f) **Community Rites and Collective Expression:** Beyond individual psychotherapy, engaging in traditional rites within a community setting becomes a powerful means of expression. Sharing personal experiences within the community allows for a collective catharsis, initiating the grieving process and leading to a more positive identity. This communal approach reduces shame, guilt, stigma, rage, and grief, fostering a sense of joy, self-worth, and reverence for ancestral heritage¹.

In essence, healing from historical trauma necessitates a comprehensive and interconnected approach, integrating diverse modalities to address the intricate layers of individual and collective pain. (Table 3)

<ul style="list-style-type: none"> • Rewarding experiences such as physical exercise and social interactions tend to increase neurogenesis. • Hands-On/ human contact can reverse nerve cell deficits, • Promoting parental resilience • Psychotherapy (Whole-Self Prebirth Psychology)/ Counseling <ul style="list-style-type: none"> ○ personal therapy ○ Somatics/ Bodywork. ○ Bioenergycorrection ○ Hypnotherapy, ○ group therapy, ○ psychedelics: LSD, psilocybin ○ yoga ○ meditation, ○ journaling, all-important. • In addition, to personal counseling, or therapy sharing one’s dreadful memories with other members of one's community in traditional ceremonies provides a cathartic release of painful emotions. <ul style="list-style-type: none"> • It initiates grief resolution including a more positive identity and a commitment to individual and community healing.
<ul style="list-style-type: none"> • This has resulted in less shame, guilt stigma, anger sadness, and an increase in joy an increase in a sense of personal power and valuation and respect for once familial origins.
<ul style="list-style-type: none"> • The government needs to provide access to indigenous cultural centers. • Community centers for refugees • Churches, mosques and synagogues can also act as cultural community centers which in turn <ul style="list-style-type: none"> • will foster culture and identity.

Table 3

Navigating Attitudinal and Social Change

Attitudinal Change: Resistance to change is a pervasive trait, making the process of modifying attitudes a complex and time-consuming endeavor. Progressive attitude change unfolds gradually over weeks, months, and sometimes years, often catalyzed by fruitful, non-coercive dialogues on conflicting ideas[241], [242]. Success in modifying attitudes is typically higher when individuals are allowed ample time to organically transform their opinions and embrace new perspectives.

Social Change: Bringing about social change, the profound transformation of individuals and communities renouncing long-held values and beliefs, is a formidable challenge. It responds to diverse cultural, economic, political, and technological forces, often in opposition to vested interests supporting the status quo. The Theory of Change (ToC), developed in the 1990s, offers insights into how change can be initiated. It integrates ideas from various fields, including social and political

sciences, organizational psychology, and environmental psychology [243]. Answering the ToC's fundamental questions helps chart the course for change:

What issue, its root causes, and long-term effects are targeted in the external/internal context?

Whom does one aim to influence or gain favor with?

What advantages (results) are sought after?

How long will it take for the advantages to materialize?

How will interventions be made to facilitate the change?

Why, and based on what evidence, can a positive evaluation be anticipated?

Addressing these questions can pave the way for a vision of a new global paradigm of coexistence. Peace-making forces, grounded in the values of appreciating ethnic contributions, can serve as catalysts for shifting history from a narrative of massacre and suffering to one of co-evolution, where entities collectively shape their destiny.

Critical Considerations in Healing Historical Trauma: Early establishment of a common understanding of healing historical trauma is paramount. Studying distinctions between changes at local and global levels, and across micro, meso, and macro levels, aids in grasping nuanced gaps. Equally crucial is the thoughtful selection of policies and initiatives aligned with shared values and philosophies.

Coordination of available resources, creation of efficient plans for diverse populations, and defining responsibility divisions need improvement. Active participation in a collaborative, multi-stakeholder experiential learning environment, using a common language, fosters meaningful outcomes.

In essence, navigating both attitudinal and social change requires a comprehensive and strategic approach, acknowledging the complexity and interconnectedness of these transformative processes.

Catalysts of Transformation: Imaginal Cells

Metamorphosis and Biology: Life frequently undergoes metamorphosis, a process well-explained in biology. In the caterpillar, dormant imaginal cells initiate the formation of a new structure. Initially, perceived as threats by the caterpillar's immune system, these cells live, develop, and communicate. As imaginal cells clump together, resonate, and exchange information, they reach a breaking point and transform into a butterfly [244]. Within the chaos of genocides, wars, and ethnic cleansing, co-evolving peaceful humanity remains active and latent [245]. Visionary leaders act as imaginal cells, paving the road for final metamorphosis.

Conclusions: The intricate relationship between pregnancy-related stress and its long-term effects draws parallels to metamorphosis. Minor dysregulations echo imaginal cells, initiating profound transformations. Genes and the environment dynamically interact, mirroring imaginal cells' evolution from single-cell entities to a genetic blueprint for a butterfly. Trauma imprints, akin to imaginal cells facing the immune system, reflect emergency reactions to traumatic memories. Persistent trauma underscores the need for comprehensive mental health approaches, akin to imaginal cells' resilience. The intergenerational transmission of stress mirrors imaginal cells' ability to communicate and form the basis for transformative change. Hope lies in recognizing co-evolving peaceful humanity within chaos. Brave leaders, the imaginal cells in diverse spheres, pave the road for metamorphosis. Understanding parallels between metamorphosis and pregnancy-related stress offers a pathway for targeted interventions, breaking the cycle of transgenerational trauma, and nurturing present and future generations' health and resilience.

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