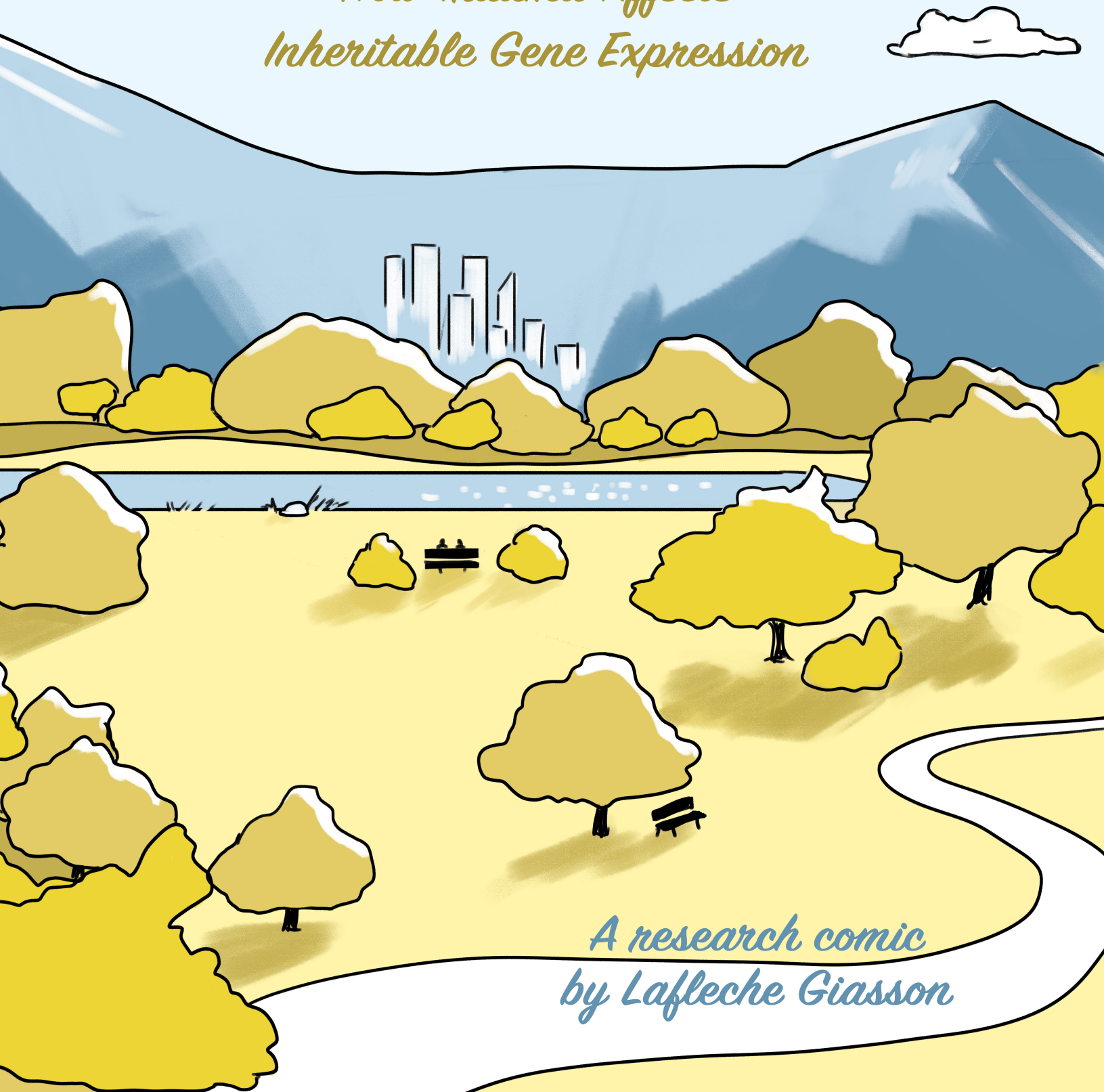


# New Leaves On The Tree

*How Trauma Affects  
Inheritable Gene Expression*



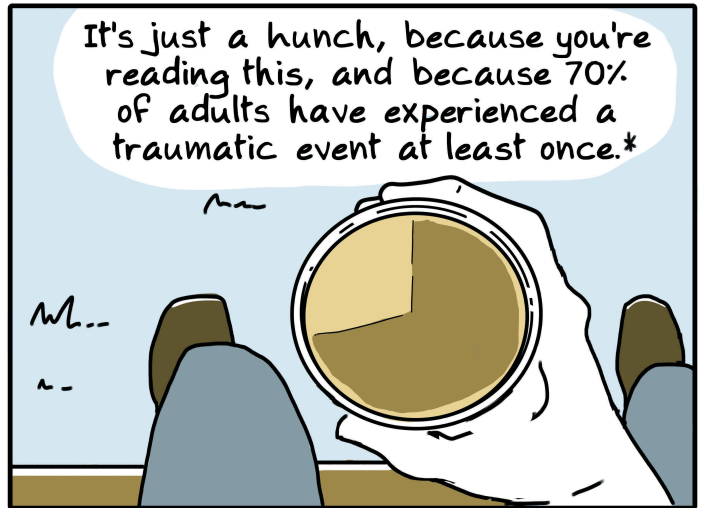
*A research comic  
by Lafleche Giasson*

# New Leaves On The Tree

*How Trauma Affects  
Inheritable Gene Expression*



*A research comic  
by Lafleche Giasson*



\*according to the National Council

Trauma can stem from:



war and violence

grief and loss

childhood abuse or neglect

natural disasters

physical, emotional, or sexual abuse

medical intervention

cultural and historical trauma

Not everyone who goes through trauma develops PTSD, but many do.

20% OF PEOPLE WHO EXPERIENCE A TRAUMATIC EVENT WILL DEVELOP PTSD

13 MILLION PEOPLE HAVE PTSD IN A GIVEN YEAR

In 2023, most people know what PTSD is and are familiar with the symptoms.

HOPELESSNESS

IRITABILITY

TROUBLE SLEEPING

TROUBLE CONCENTRATING

INTRUSIVE RECURRING MEMORIES AND NIGHTMARES

FLASHBACKS

EASILY STARTLED

INCREASED RISK OF SUBSTANCE ABUSE

RAGE

CONSTANTLY ON GUARD FOR DANGER

SEVERE EMOTIONAL DISTRESS AND PHYSICAL REACTIONS TO REMINDERS

NEGATIVE THOUGHTS ABOUT SELF, LIFE, AND THE WORLD

AVOIDANCE OF REMINDERS OF THE EVENT

DETACHMENT

SELF-DESTRUCTIVE BEHAVIORS

TROUBLE CONNECTING WITH OTHERS

NUMBNESS

SHAME

GUILT

You may be thinking, "Nothing that bad has ever happened to me. I don't get flashbacks."

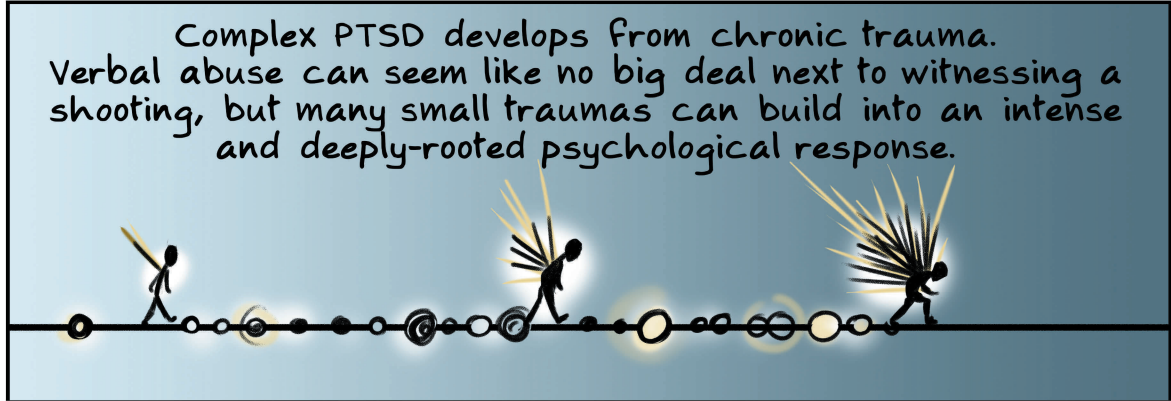
Or maybe: "Some people have gone through much worse than me. What right do I have to complain?"



Trauma occurs when attack or abandonment triggers a fight/flight response so intense the person can no longer turn it off.

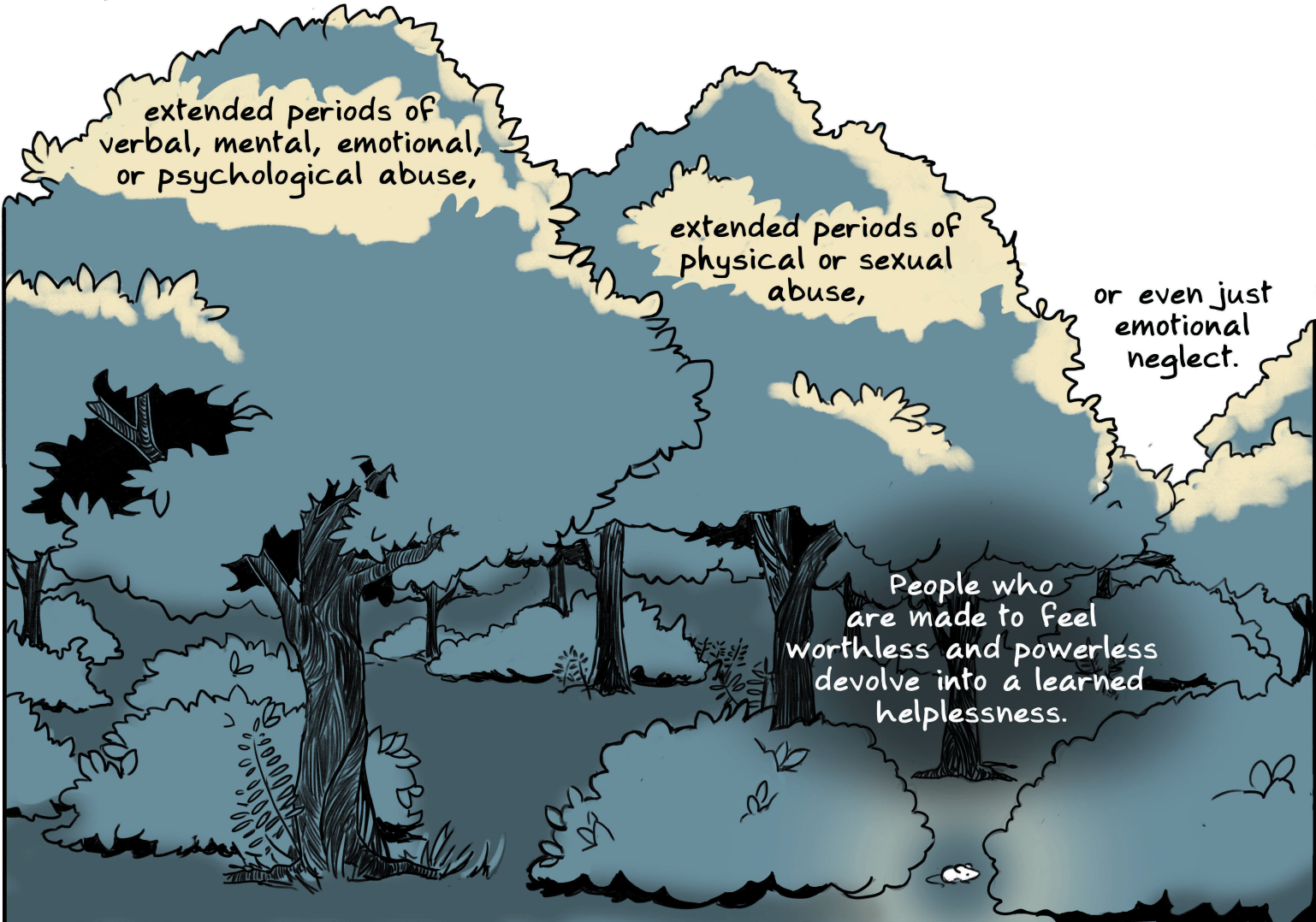


PTSD develops after a single traumatic event.



Complex PTSD develops from chronic trauma. Verbal abuse can seem like no big deal next to witnessing a shooting, but many small traumas can build into an intense and deeply-rooted psychological response.

Complex PTSD can result from:



extended periods of verbal, mental, emotional, or psychological abuse,

extended periods of physical or sexual abuse,

or even just emotional neglect.

People who are made to feel worthless and powerless devolve into a learned helplessness.

Without seeming or feeling like anything "that bad" has happened to them, people with Complex PTSD can experience:

ABJECT FEELINGS OF LONELINESS OR ABANDONMENT  
DEPRESSION  
ANXIETY  
SUICIDALITY  
RADICAL MOOD VACILATIONS

FRAGILE SELF-ESTEEM  
SELF-ABANDONMENT  
TYRANNICAL INNER CRITIC  
**TOXIC SHAME**


**EASILY STARTLED**  
HAIR TRIGGERED FIGHT/FLIGHT RESPONSE  
OVERSENSITIVITY TO STRESSFUL SITUATIONS

**SOCIAL ANXIETY**  
INHIBITION TO SEEK HELP OR CONNECTION  
RELATIONSHIP DIFFICULTIES  
**ATTACHMENT DISORDERS**

DEVELOPMENTAL ARRESTS

**EMOTIONAL FLASHBACKS**

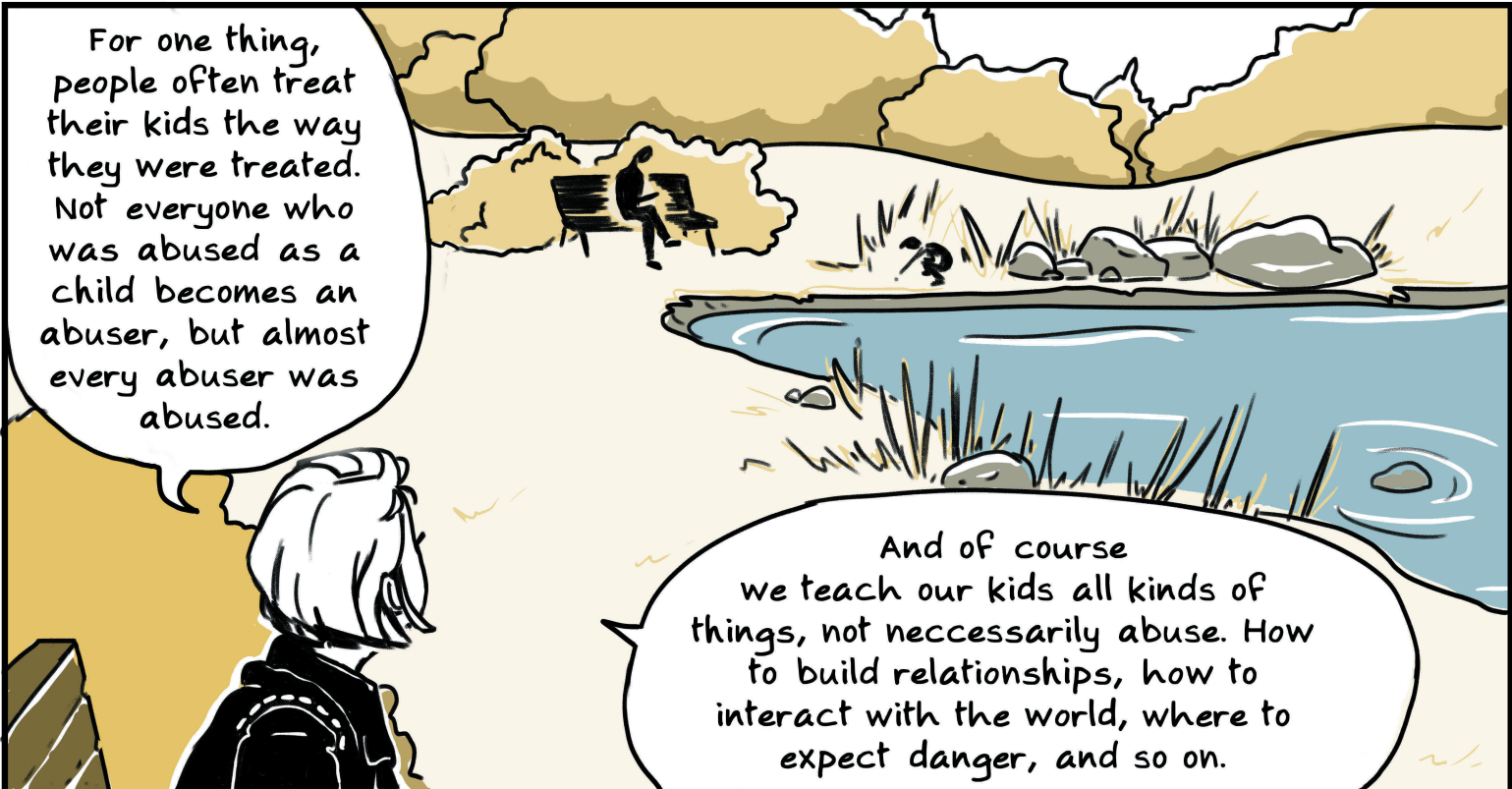





The thing is, our  
parents are  
survivors, too.



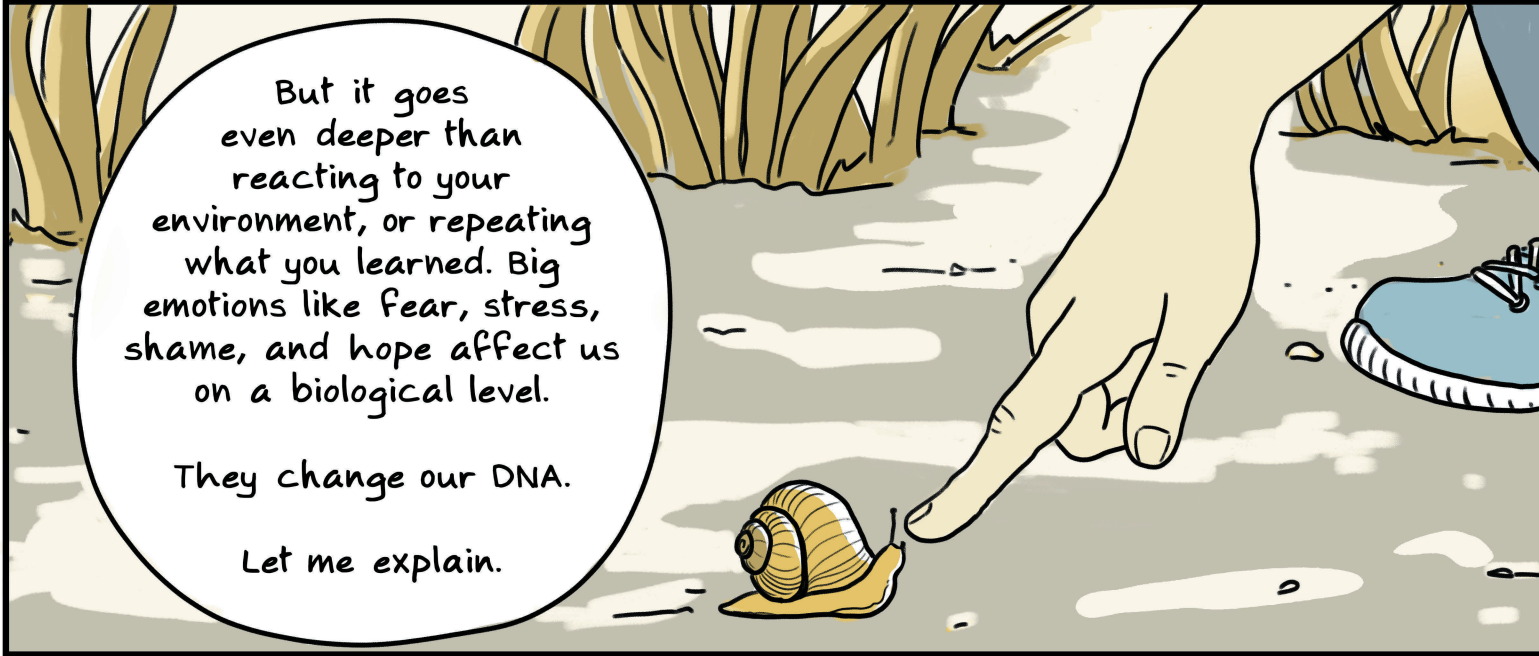
The trauma didn't  
start with them.



For one thing,  
people often treat  
their kids the way  
they were treated.  
Not everyone who  
was abused as a  
child becomes an  
abuser, but almost  
every abuser was  
abused.



And of course  
we teach our kids all kinds of  
things, not necessarily abuse. How  
to build relationships, how to  
interact with the world, where to  
expect danger, and so on.

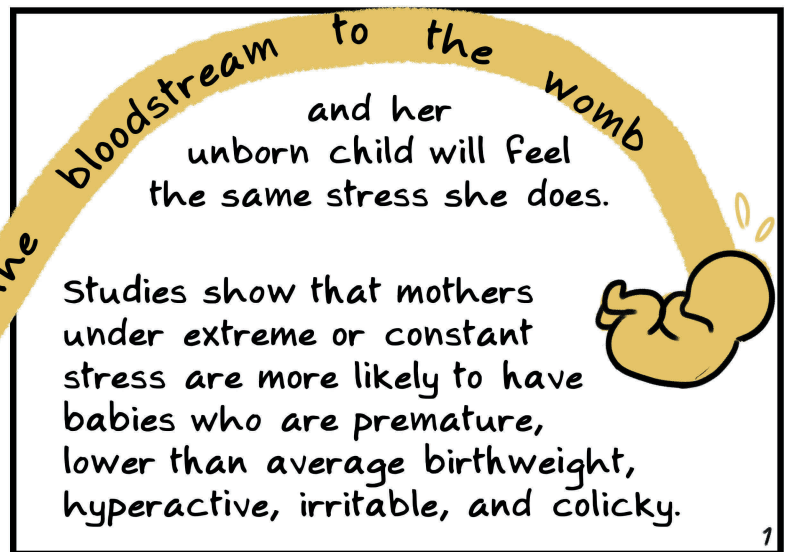
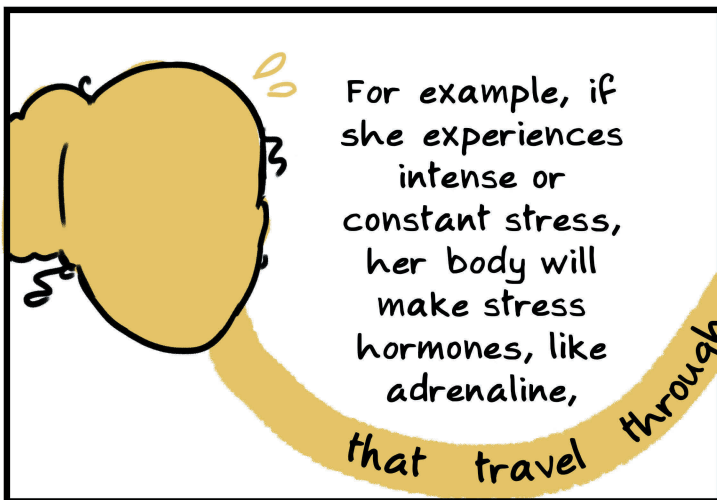


But it goes  
even deeper than  
reacting to your  
environment, or repeating  
what you learned. Big  
emotions like fear, stress,  
shame, and hope affect us  
on a biological level.

They change our DNA.

Let me explain.

We'll use research psychologist Mark Wolynn's 2016 book It Didn't Start With You to explore research done on intergenerational trauma in the preceding 20 years.





So we're directly affected by what happens to our mothers while we're in the womb,



and studies in epigenetics show us how our DNA can be affected by stuff that happened even before that.

Here's how it works.

**EPIGENETICS (n):** The study of heritable gene function that occur without a change in the sequence of DNA.

Chromosomal DNA, responsible for physical traits like eye color, hair color, etc., makes up just 2% of our total DNA.

The other 98% consists of non-Coding DNA (ncDNA), which is responsible for the emotional, behavioral, and personality traits we inherit.

ncDNA is known to be affected by environmental stressors like:

**TOXINS**

**INADEQUATE NUTRITION**

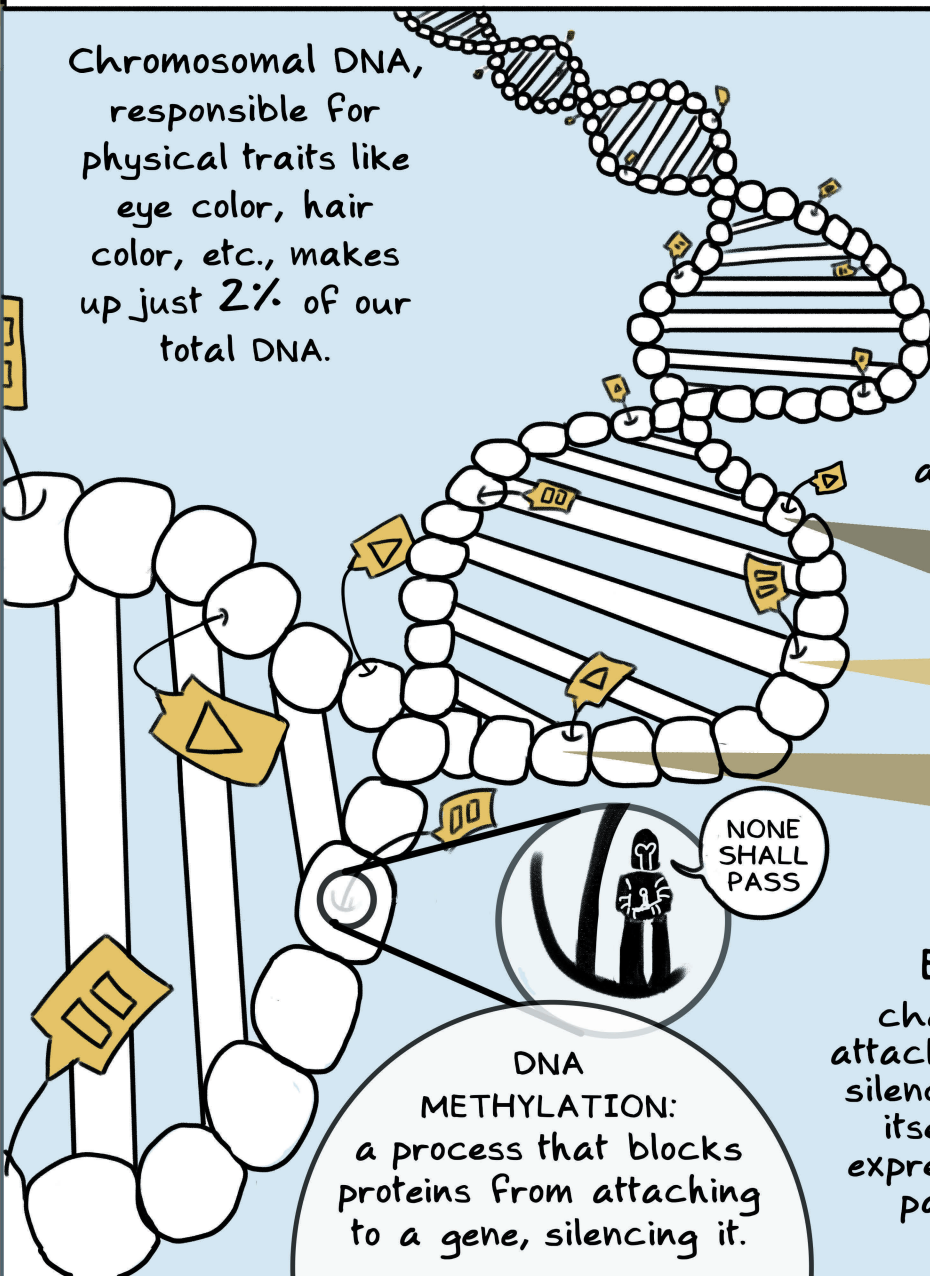
**STRESSFUL EMOTIONS**

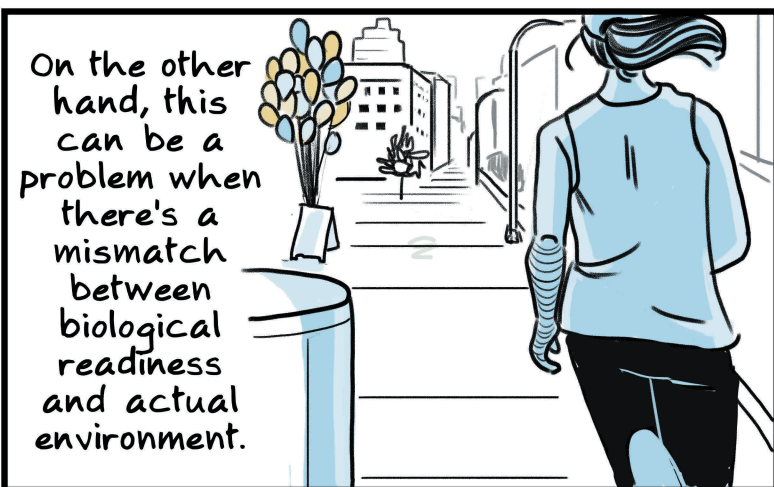
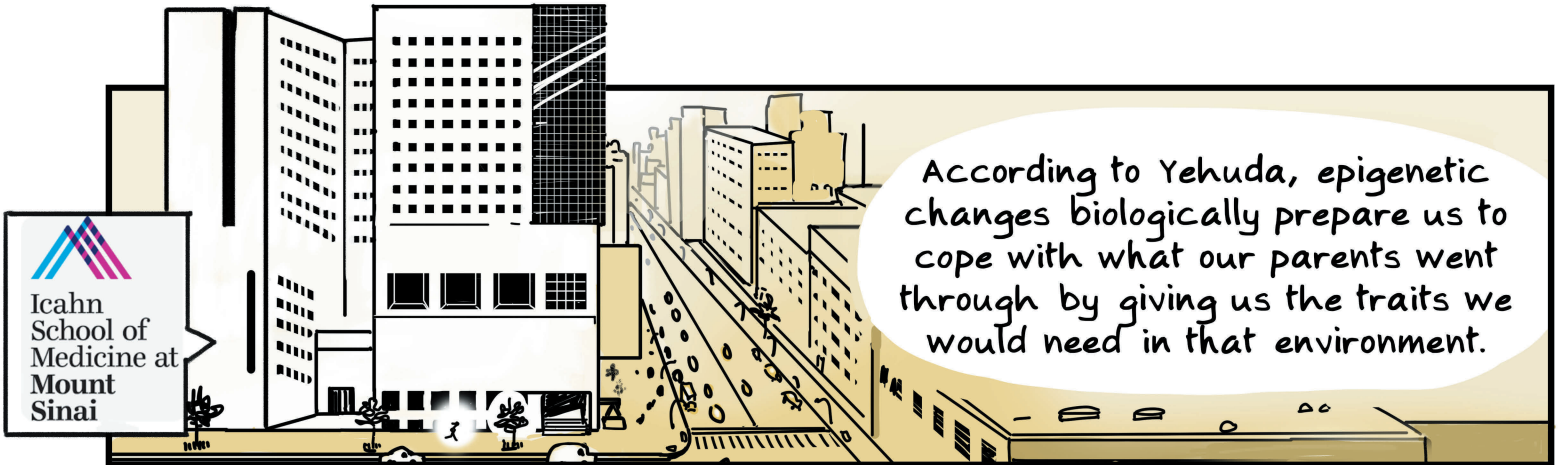
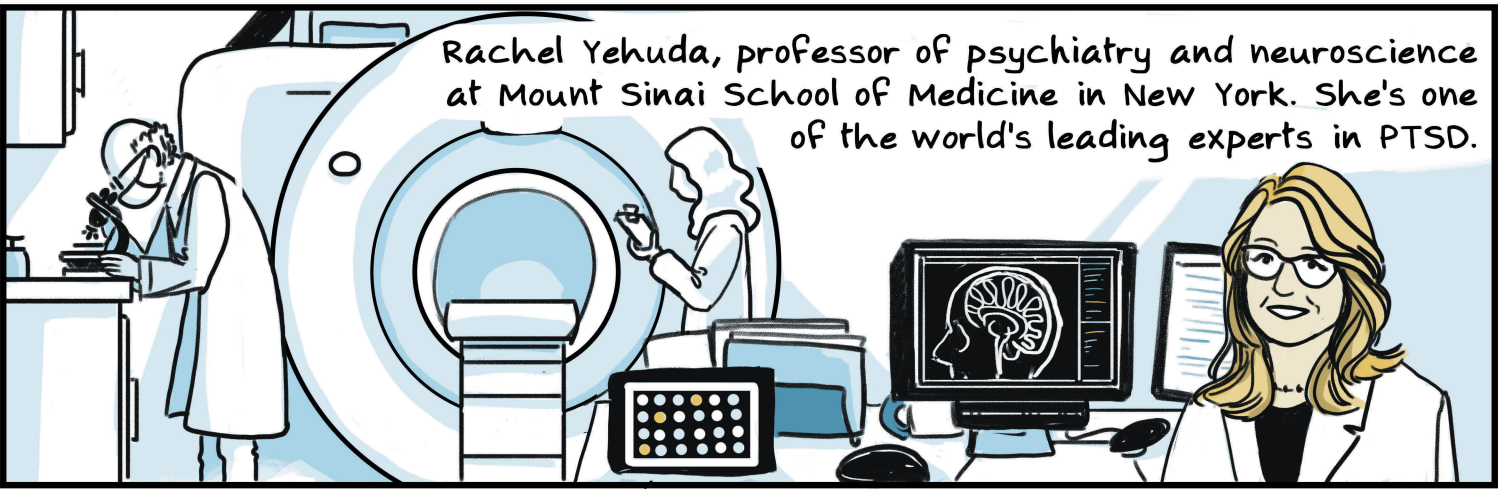
Stressors will trigger **EPIGENETIC TAGS:**

chemical signals in cells that attach to DNA to either activate or silence a specific gene. The DNA itself doesn't change, but its expression does. The tags will be passed along with the DNA.

**DNA METHYLATION:**  
a process that blocks proteins from attaching to a gene, silencing it.

NONE SHALL PASS





For example, the child of a parent who lived in a war zone might inherit the impulse to jump and recoil from sudden noises.

In response to stress, the body releases short bursts of stress hormones like cortisol.

Cortisol regulates the body's stress response.

It also regulates: metabolism, inflammation, blood pressure, blood sugar, and the sleep/wake cycle.



Chronic stress can lead to high cortisol levels, which can cause weight gain, fatigue, acne, thin skin and easy bruising, irritability, headaches, difficulty concentrating, and more.

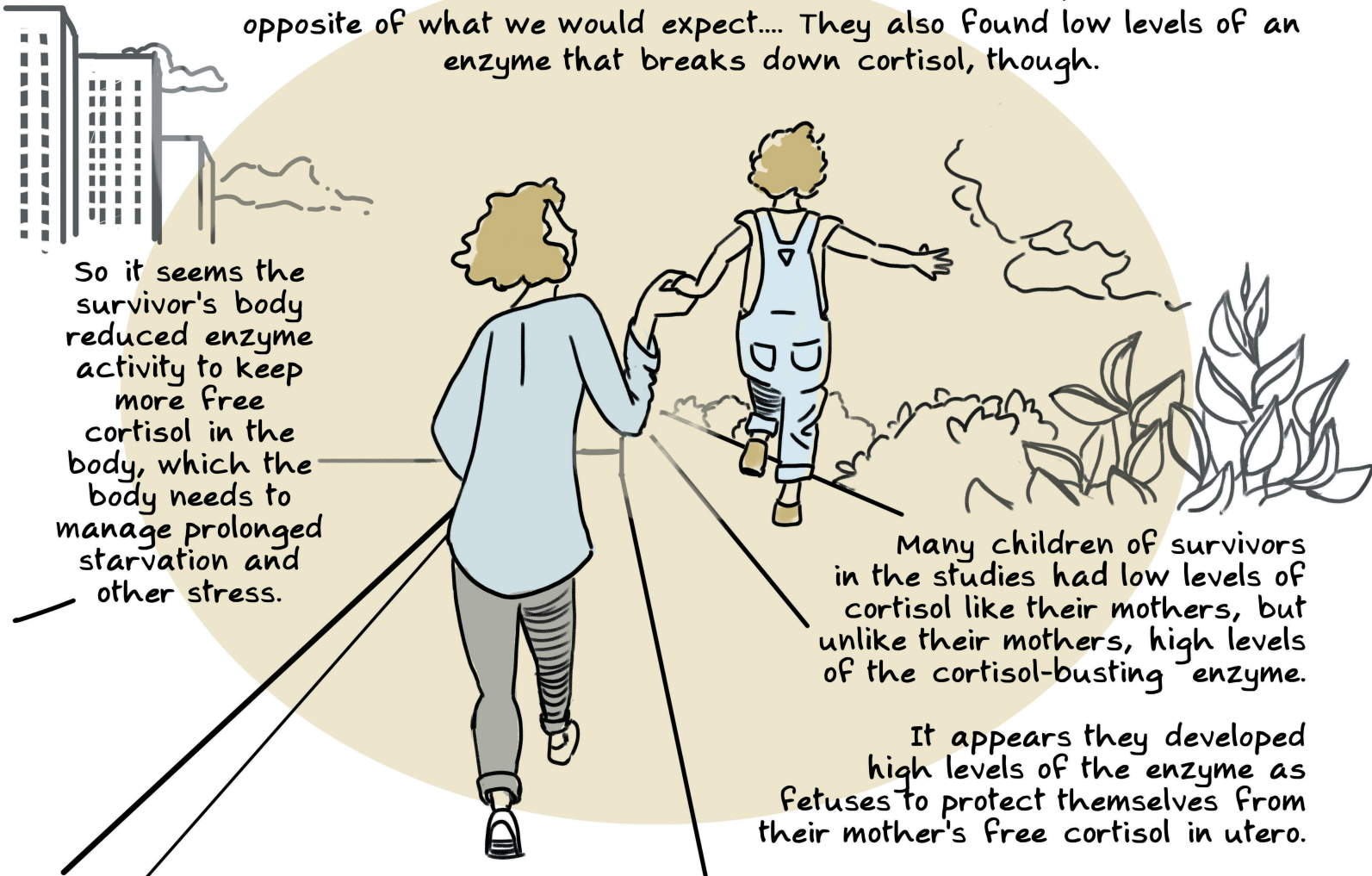
So although a high startle response might be helpful in emergency situations, in day-to-day life it could predispose someone to stress disorders and disease later in life.

It's not clear why, but the Yehuda studies found that survivors of 9/11 and of the holocaust had low levels of cortisol, which is the opposite of what we would expect.... They also found low levels of an enzyme that breaks down cortisol, though.

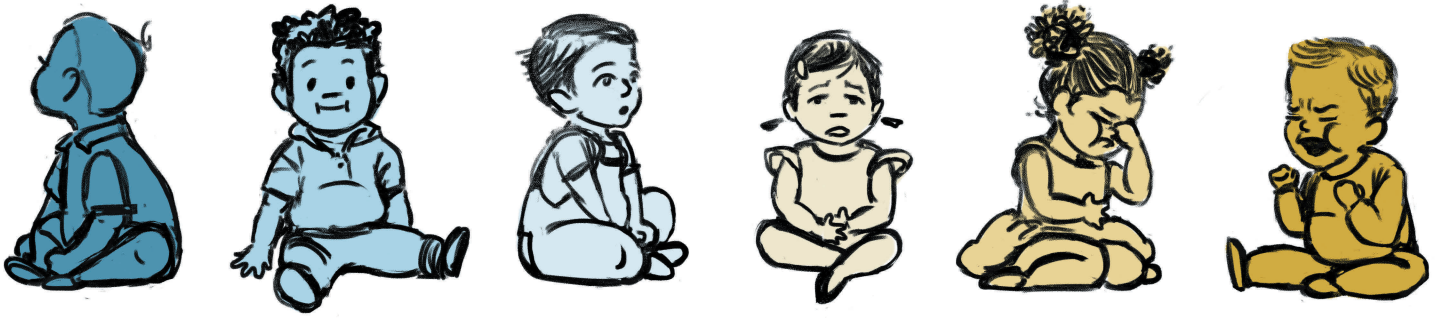
So it seems the survivor's body reduced enzyme activity to keep more free cortisol in the body, which the body needs to manage prolonged starvation and other stress.

Many children of survivors in the studies had low levels of cortisol like their mothers, but unlike their mothers, high levels of the cortisol-busting enzyme.

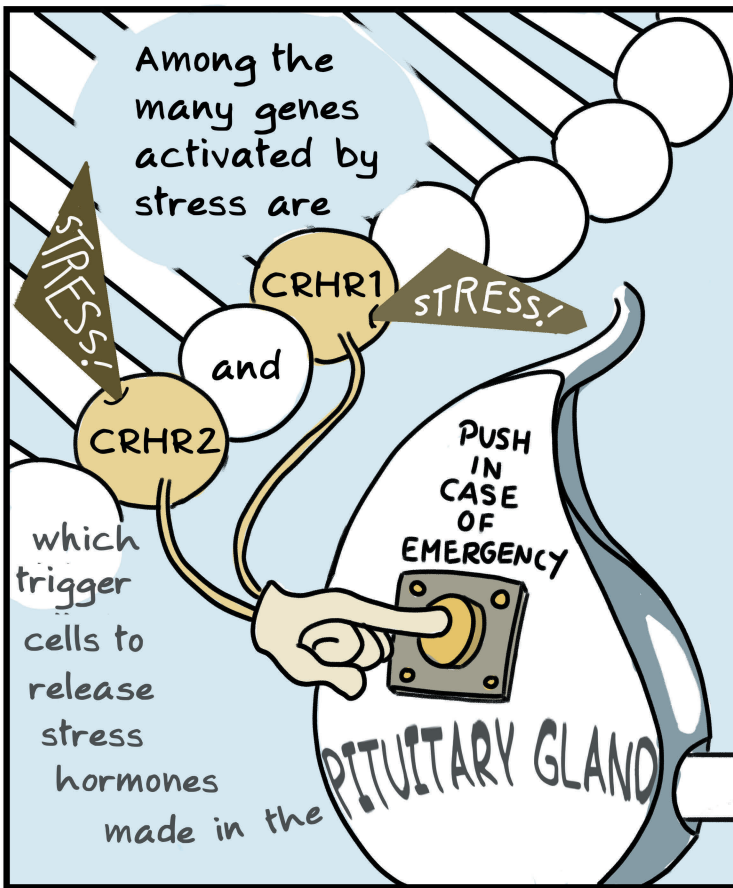
It appears they developed high levels of the enzyme as fetuses to protect themselves from their mother's free cortisol in utero.



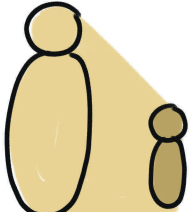
Besides low cortisol levels, Yehuda and her team also found sixteen genes that expressed differently in the children of mothers who developed PTSD after 9/11 compared to those whose mothers had not.



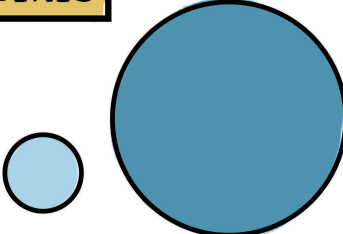
These children were more easily disrupted by loud noises and unfamiliar people.



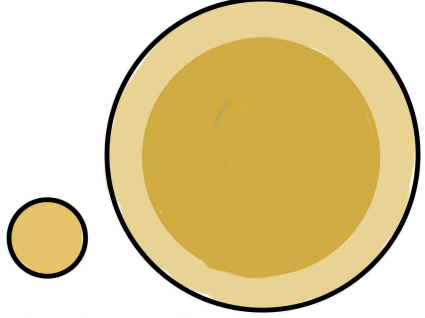
WHEN THE STRESS IS IN YOUR GENES



Children with parents struggling with PTSD will sometimes develop their own, called **Secondary PTSD**.



Children of PTSD-stricken parents are **3 times more likely to be diagnosed with PTSD**.



Children of survivors are **3-4 times more likely to struggle with depression, anxiety, and/or substance abuse**.



The study of epigenetics is pretty new, with most studies conducted after 2000.

To learn more about how trauma is passed down through multiple generations, researchers have studied mice.

99% of genes in humans have counterparts in mice.

In a 2013 study involving the offspring of stressed male mice, mice in one generation were trained to fear a cherry blossom-like scent.

Each time they were exposed to the smell, they received an electric shock.

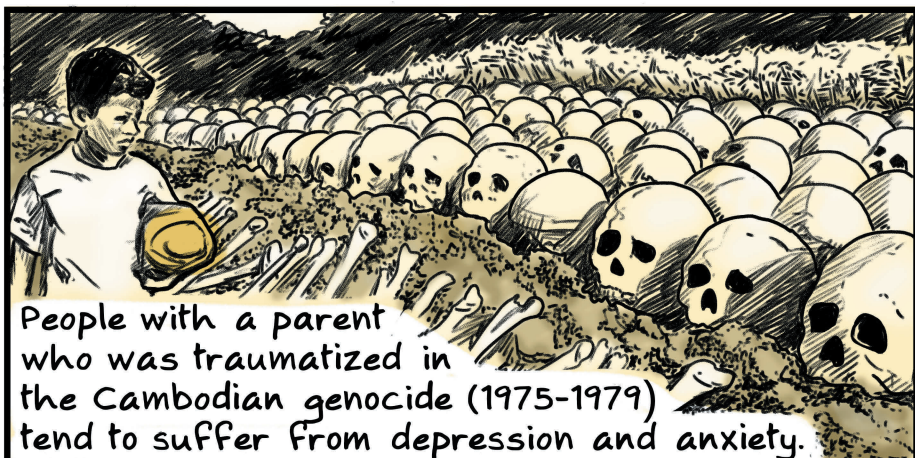
After a while, the shocked mice had a greater amount of smell receptors associated with the scent, allowing them to detect it at lower concentrations, as well as larger brain areas devoted to those receptors.

Researchers were also able to identify changes in the mices' sperm.

When exposed to the cherry blossom odor, both the pups and the grandpups of the test mice became jumpy and avoided it, even though they had never smelled it before. They also exhibited the same brain changes.

The mice appeared to inherit not only sensitivity to the scent, but also the fear response associated with it.

It's harder to gather similar data on 3 generations of humans - that takes up to 60 years! Still, there's a ton of historical evidence of intergenerational and transgenerational trauma. For example:



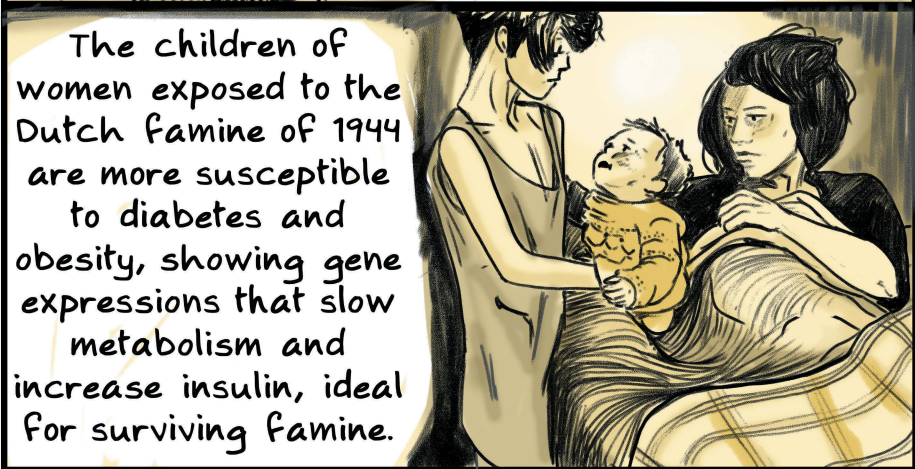
People with a parent who was traumatized in the Cambodian genocide (1975-1979) tend to suffer from depression and anxiety.



Many young people born in Rwanda after the Rwandan Genocide (1994) experience the same PTSD symptoms as those who survived it.



Children of Australian veterans of the Vietnam War (1955 -1975) have higher rates of suicide than the general population.



The children of women exposed to the Dutch famine of 1944 are more susceptible to diabetes and obesity, showing gene expressions that slow metabolism and increase insulin, ideal for surviving famine.

## Intergenerational vs Transgenerational

Inheritance:

What's the difference?



**Intergenerational epigenetic inheritance** refers to changes in gene expression caused by parental exposure to a stressor when offspring cells are present in the body.

When a pregnant woman is exposed to a stressor, the fetus AND the egg and precursor sperm cells in the fetus are also directly exposed.



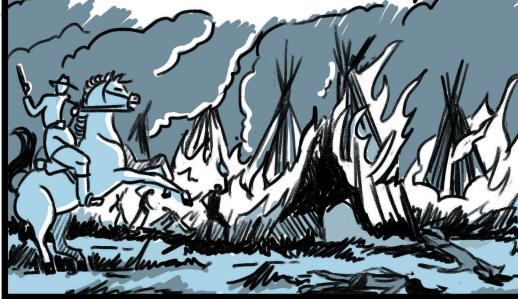
**Transgenerational epigenetic inheritance** refers to the altered gene expression in the generations after those that were "there" for the trauma.

The persisting effects of gross cultural oppression in Indigenous people is a perfect, horrific example of transgenerational trauma.

There is estimated to have been 50-150 million Indigenous people living in North America before 1492.



At the hands of endless wars and massacres, foreign disease, forced relocations and racial violence,



the population dwindled to 4 million by 1900.



The largest genocide in history.

In the campaign to wipe out Indigenous culture, the US and Canadian governments opened mandatory "Native Assimilation" Christian boarding schools.



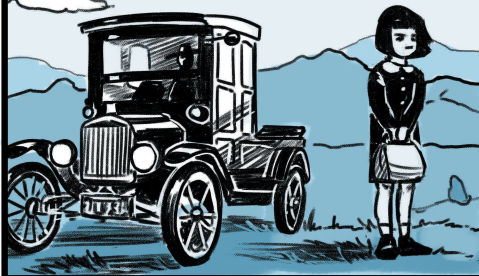
US schools forcibly housed 60,000 Indigenous children from 1860 to 1928.

Students were physically, sexually, mentally, emotionally, and spiritually abused.



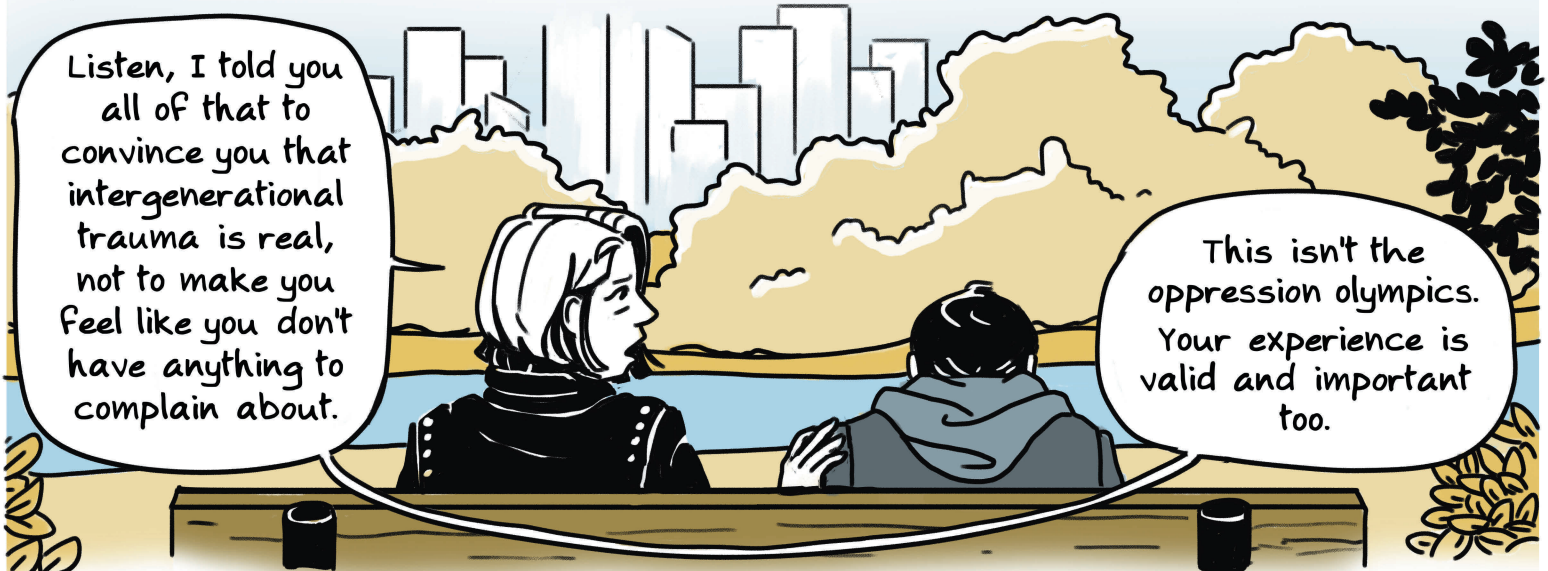
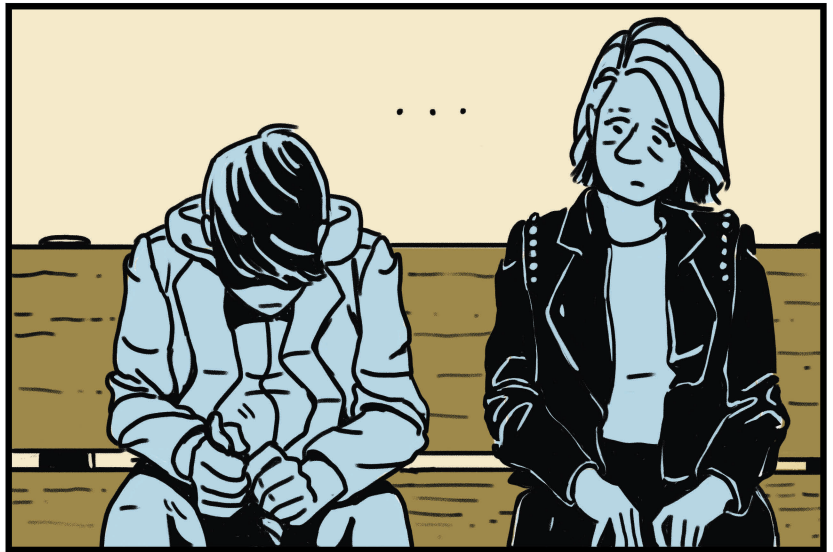
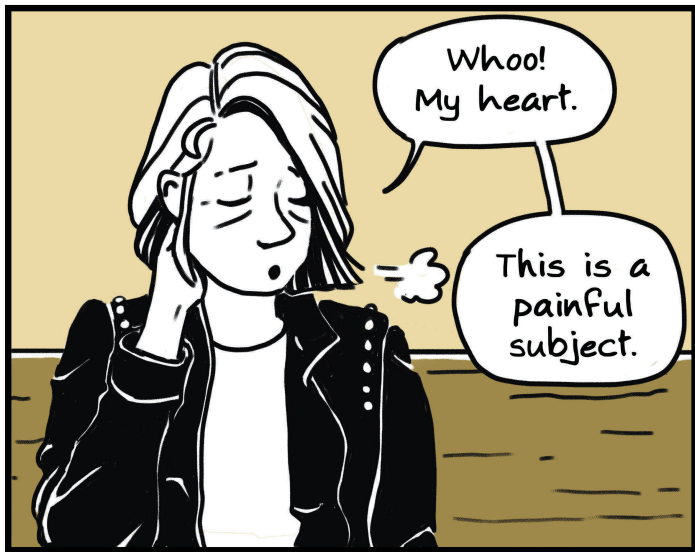
Thousands died from illness and mistreatment in awful conditions.

Survivors returned home permanently scarred by the abuse and loss of identity.

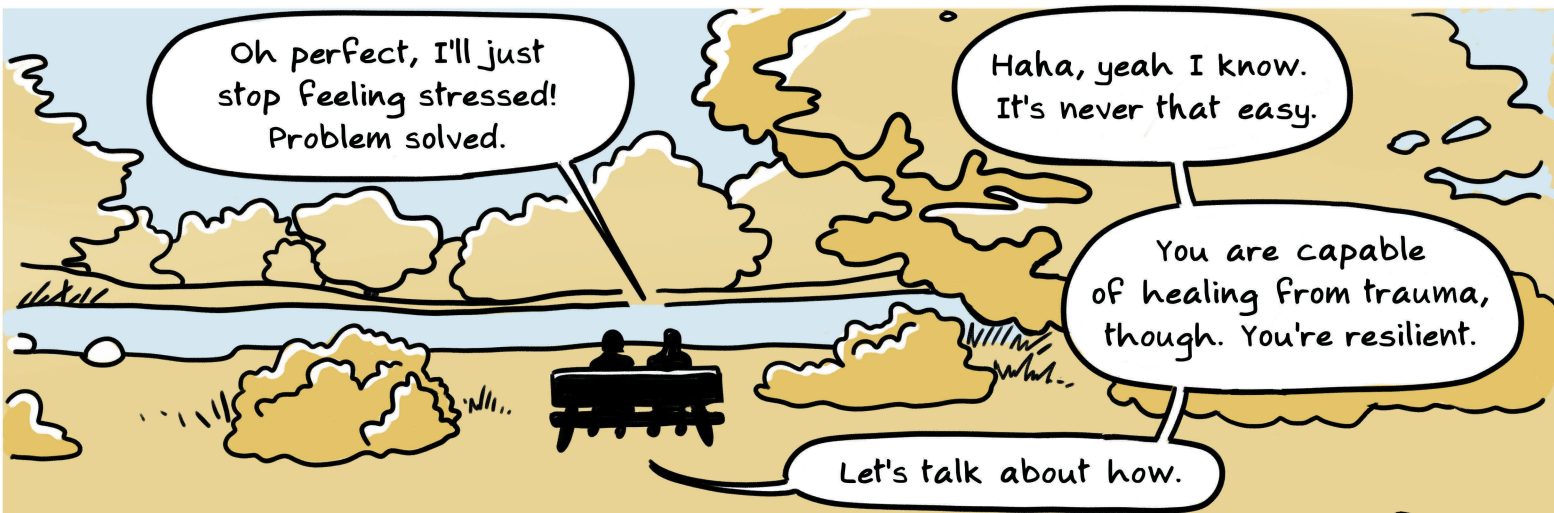


Generations later, Indigenous youth still carry the collective cultural trauma, suffering exceeding rates of:



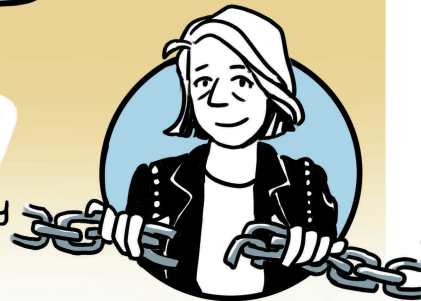






## A GUIDE FOR CYCLE BREAKERS

Semi-expert advice on healing from your family trauma and changing your gene expression.



STEP  
1

Recognize your core trauma language.

What fears do you have that are connected to your past? To your family history?

What fears do you have that don't seem connected to anything that's happened to you? Maybe they didn't come from you. Maybe they started with someone in your family.



Once you figure out where your fear came from in the past, you can stop living with it like it belongs in the present.

## STEP

# 2

Call your mom. Or your dad. Or your grandma.

Regardless of whether or not they are good at parenting, our parents are an inextricable part of us.

Being at peace with ourselves often begins with being at peace with our parents.



Don't expect your parents to be any different than who they are. Your trauma didn't start with you, but you have to be the one to heal it.

## STEP

# 3

Get therapy.

Healing is really hard.

You don't have to do it alone.

A therapist's support and insight makes a world of difference when you're trying to understand and heal yourself.

## STEP

# 4

Focus on Love.

Remember that people love and support you. With repeated focused attention on thoughts of love, compassion, and well-being, you can create new neural pathways in your brain and reverse the effects of trauma in your genes.



## *A Note from the Author*

Comics are wonderful for presenting information with efficiency and impact.

That means also that the information I didn't have space to include in this brief exploration of a complicated topic could and does fill full-length books. I am not a therapist, a psychologist, or a medical expert. All the knowledge I have, I gained from personal experience and from researching this comic.

I encourage you to read my sources further,

especially:

It Didn't Start With You:

How Inherited Family Trauma Shapes Who We Are and

How to End the Cycle by Mark Wolynn,

my source for most of the research and advice presented in this comic.

If this topic resonated with you, I really recommend reading it for the full depth of Wolynn's research and expert advice.

It sure as hell helped me.

Also available as an audiobook.



# Sources

## PAGE 1

"How To Manage Trauma." TheNationalCouncil.Org, The National Council for Mental Wellbeing, Aug. 2022, [www.thenationalcouncil.org/wp-content/uploads/2022/08/Trauma-infographic.pdf](http://www.thenationalcouncil.org/wp-content/uploads/2022/08/Trauma-infographic.pdf).

## PAGE 2

Zauderer, Steven. "51 PTSD Statistics & Facts: How Common Is PTSD?" Cross River Therapy, 11 Jan. 2023, [www.crossrivertherapy.com/ptsd-statistics#:~:text=An%20estimated%2070%25%20of%20adults,PTSD%20at%20any%20given%20time.](http://www.crossrivertherapy.com/ptsd-statistics#:~:text=An%20estimated%2070%25%20of%20adults,PTSD%20at%20any%20given%20time.)

## PAGES 3 - 4

Walker, Pete. *Complex PTSD: From Surviving to Thriving : A Guide and Map for Recovering From Childhood Trauma*. First Edition. Lafayette, CA, Azure Coyote, 2013.

## PAGE 6

Wolynn, Mark. *It Didn't Start With You: How Inherited Family Trauma Shapes Who We Are and How to End the Cycle*. New York, Viking, 2016, pp 28.

## PAGES 7-8

Wolynn, Mark. *It Didn't Start With You: How Inherited Family Trauma Shapes Who We Are and How to End the Cycle*. New York, Viking, 2016, pp 29-30.

## PAGE 9

Yehuda, Rachel, et al. "Transgenerational effects of posttraumatic stress disorder in babies of mothers exposed to the World Trade Center attacks during pregnancy." *The Journal of Clinical Endocrinology & Metabolism*, vol. 90, no. 7, July 2005, <https://doi.org/10.1210/jc.2005-0550>.

## PAGE 10

Wolynn, Mark. *It Didn't Start With You: How Inherited Family Trauma Shapes Who We Are and How to End the Cycle*. New York, Viking, 2016, pp 31-33.

## PAGE 11

Wolynn, Mark. *It Didn't Start With You: How Inherited Family Trauma Shapes Who We Are and How to End the Cycle*. New York, Viking, 2016, pp 35-37.

## PAGE 12

Wolynn, Mark. *It Didn't Start With You: How Inherited Family Trauma Shapes Who We Are and How to End the Cycle*. New York, Viking, 2016, pp 32-33.

Zimmer, Carl. "The Famine Ended 70 Years Ago, but Dutch Genes Still Bear Scars." *The New York Times*, *The New York Times*, 31 Jan. 2018, [www.nytimes.com/2018/01/31/science/dutch-famine-genes.html](http://www.nytimes.com/2018/01/31/science/dutch-famine-genes.html).

## PAGE 13

Smith, David Michael. "Counting the Dead: Estimating the Loss of Life in the Indigenous ..." *Se.Edu*, Southeastern Oklahoma State University,

[www.se.edu/native-american/wp-content/uploads/sites/49/2019/09/A-NAS-2017-Proceedings-Smith](http://www.se.edu/native-american/wp-content/uploads/sites/49/2019/09/A-NAS-2017-Proceedings-Smith).

"US Indian Boarding School History." *The National Native American Boarding School Healing Coalition*, [boardingschoolhealing.org/education/us-indian-boarding-school-history/](http://boardingschoolhealing.org/education/us-indian-boarding-school-history/).

## PAGES 15

Wolynn, Mark. *It Didn't Start With You: How Inherited Family Trauma Shapes Who We Are and How to End the Cycle*. New York, Viking, 2016, pp 57.

## PAGE 16

Wolynn, Mark. *It Didn't Start With You: How Inherited Family Trauma Shapes Who We Are and How to End the Cycle*. New York, Viking, 2016, pp 156.



## *About the Artist*

At age 17, Lafleche Giasson escaped a cult and is now a lifetime later doing the real work of healing from it. Her comic work focuses on intergenerational trauma and compassionate storytelling.

 @laflechejeannette