

NEW

# N'COBRA

National Coalition Of Blacks For Reparations In America



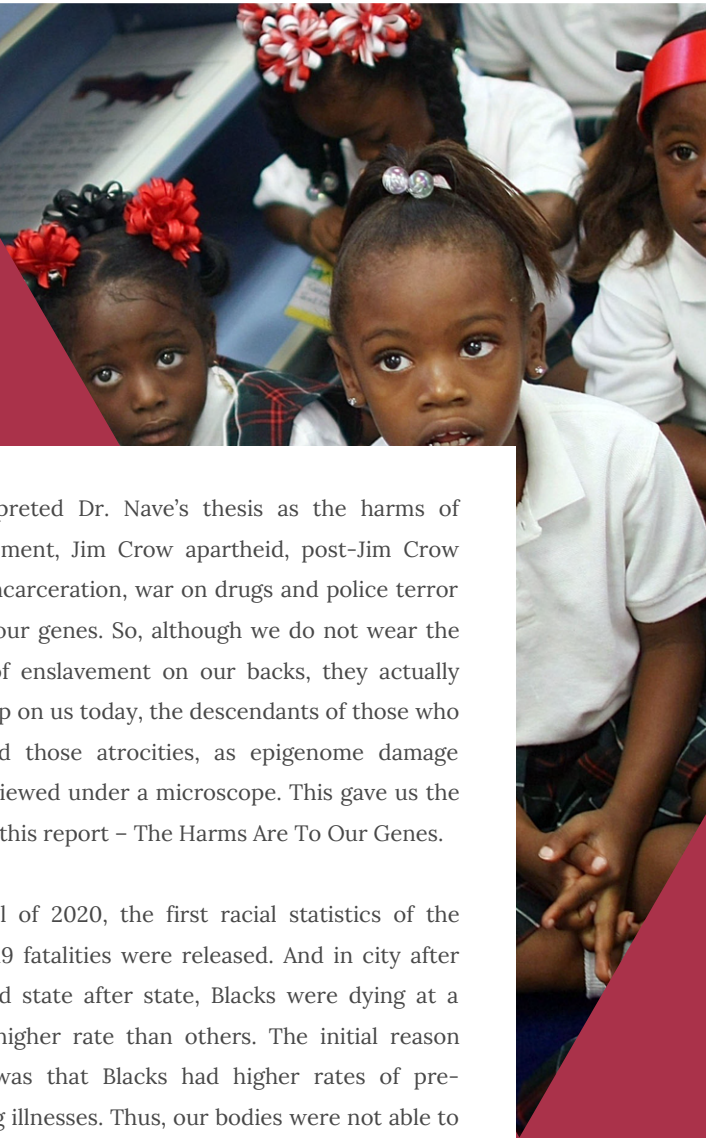
2021 REPORT

## The Harm Is To Our Genes

Transgenerational Epigenetic Inheritance &  
Systemic Racism in the United States

By Joan Kaufman, Maria Khan, Julia Mancini, and Yvonne Summers White

# INTRODUCING THE HARM IS TO OUR GENES



In 2015, I received an email from Dr. Kenneth Nave, MD of Chicago, with research on transgenerational epigenetics. This was the first time I had ever heard of the term. Dr. Nave was working on a theory to overcome the “standing” issue that was used to deny Blacks reparations in the 2005 federal reparations lawsuit. The lawsuit targeted various corporations for their atrocities during and after enslavement, as well as their enrichment from those atrocities. Judge Charles Norgle, of the US District Court of Northern District of Illinois made the ruling.

Standing, deals with the ability to sue, based on the person suing being the actual injured party or closely related to the injured party – like spouse or child, and in some cases, grandchild. Being “too far removed” from the crimes of enslavement (multiple generations past), ruled Norgle, prohibited us from having standing to sue.

Dr. Nave, on the other hand, saw it differently. He understood that historical trauma negatively manipulates gene structures, that those manipulations create a high probability for illness, that the changes and propensity for illness can, and often are, passed down multiple generations, and finally that the historical trauma never really ended for us. So, Dr. Nave concluded we were in fact, *the actual injured parties* based on this inherited injury. His work led to the book, **Competent Proof: The Legal Standing African Americans Have in the Battle for Slavery Reparations.**

I interpreted Dr. Nave’s thesis as the harms of enslavement, Jim Crow apartheid, post-Jim Crow mass incarceration, war on drugs and police terror are in our genes. So, although we do not wear the scars of enslavement on our backs, they actually show up on us today, the descendants of those who endured those atrocities, as epigenome damage when viewed under a microscope. This gave us the title to this report – The Harms Are To Our Genes.

In April of 2020, the first racial statistics of the Covid 19 fatalities were released. And in city after city and state after state, Blacks were dying at a much higher rate than others. The initial reason given was that Blacks had higher rates of pre-existing illnesses. Thus, our bodies were not able to fight off the virus. I connected this high death rate to the historical harms that have impacted our genes. The pre-existing illnesses that Blacks have at an alarming rate – diabetes, heart disease, hypertension, are all illness that are associated with transgenerational epigenetic inheritance. I immediately wrote an article, “*Trans-Generational Epigenetic Injury is the Cause of the Higher Black Deaths from Covid 19.*”

That article, published in the *Chicago Crusader*, led to several conversations and presentations within N’COBRA and the Black Community. Those conversations led to the need to examine and assemble the existing scientific literature on historical trauma, transgenerational transmission of trauma and transgenerational epigenetic



# INTRODUCING THE HARM IS TO OUR GENES

inheritance (injury). Shortly thereafter, I was connected to Dr. Joan Kaufman of the Kennedy Krieger Institute, an affiliate of Johns Hopkins School of Medicine. Dr. Kaufman was very familiar with the subject and had done a similar type of scientific review on adverse childhood experiences. This connection has proved to be fruitful.

In releasing this report, *The Harm is To Our Genes*, N'COBRA has five (5) outcomes we desire:

1. **Inclusion** – we want all discussions on the health disparities of the Black community to include the fact that this community, and only this community, has experienced over 400 years of historical trauma in the manner in which it has (i), which can, has, and will possibly negatively impact our health at some point in our lifetime.

2. **Resources** – we want resources directed to mitigate the effect of the historical trauma, i.e., transgenerational transmission of trauma and transgenerational epigenetic inherited injury.

3. **Research** – as most of the research on transgenerational epigenetic inheritance has been on animals, we want specific research on our communities by our researchers, with our practitioners to chart a course of transgenerational healing for our community.

4. **Awareness** – we want cities, states, and the federal government to provide awareness information on the existence and possible ways that our community can individually address this reality.

5. **Decolonization of Health** – many alternative healing modalities, in particular, African, and African-centered healing modalities must be understood, accepted, adopted, funded, and utilized in the effort to heal our communities from the centuries of terror, trauma, and abuse.

This is just the beginning. Let's work to heal the harm that is to our genes.

*Following this Harm Report is a Post Script by N'COBRA's Health Commission, entitled, African Centered Healing is Essential to Our Health and Well-being.*

*(i) Hunter Adams, III, describes our experience as “ a singularity of subjugation – never before in human history has an equivalent system of exploitation occurred so comprehensive it resulted in “complete defeat” – the denial of a people's ability to survive on their own terms, loss of control of their children's custody and socialization, and ultimately, loss of control of their future.*



November 2021

# EXECUTIVE SUMMARY

Since Africans were first brought to this continent against their will by the Spanish in 1526, there have been government and socially sanctioned atrocities against African descendants. Historical trauma and ongoing systemic racism has a toll, not just on the psyche of African Americans, but on their physical health as well. It is well established that experiences of trauma and adversity can “get under the skin” and increase risk for a whole host of significant health problems.

This report is organized into seven sections:

**1) The first section provides a concise overview of the historic trauma experienced by African Americans:**

The middle passage, slavery, and lynchings are briefly discussed.

**2) The second section discusses key structures in American society that perpetuate cycles of disadvantage and ongoing experiences of adversity and trauma for African descendants:**

The need for reform in the criminal justice system is highlighted, given the extraordinary rates of mass incarceration in this country and the profound negative effects of incarceration, not just on the ex-prisoner, but on their partners and children as well. Legislation and proposals to address other key structures that perpetuate disadvantage, adversity, and trauma are also discussed in this report.

**3) The third section discusses data that links adversity and trauma to a whole host of medical health problems:**

Experiences of adversity increase risk for problems with obesity, diabetes, heart disease and more.



African  
**DESCENDANTS**



# EXECUTIVE SUMMARY

*Continued*

**4) The fourth section provides an introduction to the field of epigenetics and the concept of transgenerational epigenetic inheritance:**

Transgenerational epigenetic inheritance is the transmission of the deleterious effects of ancestral traumas through chemical (e.g., epigenetic) modifications to the DNA that are inherited across generations. Through transgenerational epigenetic inheritance, grandchildren and great grandchildren can be negatively impacted by the ancestral traumas -- even when they have not been directly exposed to any adversity themselves.

**5) The fifth section reviews state-of-the art research on transgenerational epigenetic inheritance:**

While there has been skepticism in the field that chemical modifications to the DNA in one generation caused by stress or other negative experiences could be inherited in subsequent generations, a growing body of animal research on transgenerational epigenetic inheritance strongly suggests that ancestral adversities can negatively impact descendants across multiple generations through epigenetic (e.g., chemical) changes to the DNA in the germline (e.g., sperm, eggs). Epidemiological and clinical studies also support the relevance of this work in understanding the transgenerational transmission of adversity in human cohorts.

**6) The sixth section discusses factors that can mitigate the effects of historical and personal trauma and promote strength and resilience:**

The animal literature has demonstrated that the epigenetic modifications and deleterious outcomes across generations associated with various negative exposures can be prevented through a range of different experimental manipulations. Trauma-informed clinical services, culturally-grounded preventive interventions, and positive enriching educational, sports, and art experiences have also been found to mitigate the effects of historical trauma and various lifetime adverse experiences.

**7) The seventh section delineates policy, practice, and research recommendations to address systemic racism in America:**

While more basic (e.g., animal) and clinical research is needed to fully elucidate the molecular mechanisms by which experience can alter the epigenome and impact health and developmental trajectories across multiple generations, more research is not required to demonstrate the need to dismantle the systems that perpetuate disadvantage, adversity, and trauma among African descendants.

Let's Act  
**NOW**

**The cost to the individual and to society is enormous. The time to act is now.**

# THE HARM REPORT

Nine minutes and twenty-nine seconds woke the world on May 25, 2020. On that day, Darnella Frazier, a then 17-year old girl from Minneapolis, filmed the police officer Derek Chauvin with his knee on George Floyd's neck. The murder of Mr. Floyd led to protests in over 2,000 cities and towns across the United States, and 60 countries around the globe. It is estimated that between 15-26 million people participated in these demonstrations.<sup>(1)</sup>

May 31 through June 1, 2021 marked the 100 year anniversary of the Black Wall Street Massacre, when a white mob descended on Tulsa's Black Greenwood neighborhood killing hundreds of people, destroying many successful businesses, and leaving thousands homeless. Property damage amounted to more than \$1.5 million in real estate and \$750,000 in personal property, or losses equivalent to about \$32.65 million in today's currency.<sup>(2)</sup>

Since Africans were first brought to this continent against their will by the Spanish in 1526,<sup>(3)</sup> government and socially sanctioned atrocities against African descendants have continued. Historic trauma and ongoing systemic racism has a toll, not just on the psyche of African Americans, but on their physical health as well.

It is well established that experiences of trauma and adversity can "get under the skin" and increase risk for a whole host of negative social,<sup>(4-9)</sup> psychiatric,<sup>(10-12)</sup> and medical health problems.<sup>(5,13-18)</sup>

## Can the impact of trauma be transmitted transgenerationally?

The concept of generational trauma was first introduced in 1967 by Vivian Rakoff, a Canadian psychiatrist who recorded markedly elevated rates of psychological distress among children of Holocaust survivors<sup>(19,20)</sup>. Since that initial publication, multiple investigators have reported elevated rates of psychological distress in the children<sup>(21,22)</sup> and grandchildren<sup>(23-25)</sup> of Holocaust survivors. There have also been a number of epidemiological studies which suggest parental exposure to trauma and stress, inadequate nutrition, and toxicants can impact the health of descendants across several generations.<sup>(26-28)</sup>

## Report Organization

This report is organized into seven sections: 1) The first section provides a brief overview of the historical trauma experienced by African Americans; 2) The second section discusses key structures in American society that perpetuate cycles of disadvantage and ongoing experiences of adversity and trauma for African descendants; 3) The third section discusses data that links adversity and trauma to a whole host of medical health problems; 4) The fourth section provides an introduction to the field of epigenetics and the concept of transgenerational epigenetic inheritance; 5) The fifth section reviews state-of-the art research on transgenerational epigenetic inheritance; 6) The sixth section discusses factors that can mitigate the effects of historical and personal trauma and promote resilience and recovery; and 7) the seventh section delineates policy, practice, and research recommendations to address systemic racism in America.



May 31 through June 1, 2021 marked the 100 year anniversary of the Black Wall Street Massacre...



# THE HARM REPORT

*Continued*

## 1) HISTORICAL TRAUMA

Historical trauma has been defined as events that are so widespread as to affect an entire culture; such events also have effects intense enough to influence generations of the culture beyond those who experienced them directly.<sup>(29)</sup> Volumes have been written documenting the historical trauma experienced by African descendants; this section will inevitably be inadequate in doing justice to that history. Key segments of that history are briefly highlighted.

*The Middle Passage.* Historians estimate that thirty million Africans were deported from different parts of Africa and enslaved.<sup>(30)</sup> An estimated 14.4% of captured Africans died in transit,<sup>(31)</sup> and punishment and torture throughout the trip across the sea was very common.<sup>(32)</sup> According to an eye-witness report:



**Figure 1:** Ankle shackles used to restrain enslaved people aboard ships in the Middle Passage.

*The men Negroes, on being brought aboard ship, are immediately fastened together two and two, by handcuffs on their wrists, and by irons riveted on their legs. They are frequently stowed so close as to admit of no other posture than lying on their sides (pg. 124).<sup>(33,34)</sup>*



Historical  
**TRAUMA**

Events that are so widespread  
as to affect an entire culture.



# THE HARM REPORT

*Continued*

*Slavery.* Frederick Douglass was born into bondage and secretly taught himself to read and write -- a crime that was punishable by death. His book, *Narrative of the Life of Frederick Douglass: An American Slave*, provides one of the most comprehensive first-person accounts of slavery in America.<sup>(35)</sup> In describing matters for which an enslaved person could be whipped, he noted:

*A mere look, word, or motion,- - a mistake, accident, or want of power,- - are all matters for which a slave may be whipped at any time. Does a slave look dissatisfied? It is said, he has the devil in him, and it must be whipped out. Does he speak loudly when spoken to by his master? Then he is getting high- minded, and should be taken down a button-hole lower. Does he forget to pull off his hat at the approach of a white person? Then he is wanting in reverence, and should be whipped for it. Does he ever venture to vindicate his conduct, when censured for it? Then he is guilty of impudence,- - one of the greatest crimes of which a slave can be guilty. Does he ever venture to suggest a different mode of doing things from that pointed out by his master? He is indeed presumptuous, and getting above himself.... (pg. 79).*

Lewis Clarke, an enslaved child in Kentucky, described his experiences of being frequently whipped by his mistress.<sup>(36)</sup>

*[My mistress's] instruments of torture were ordinarily the raw hide, or a bunch of hickory-sprouts seasoned in the fire and tied together. But if these were not at hand, nothing came amiss. She could relish a beating with a chair, the broom, tongs, shovel, shears, knife-handle, the heavy heel of her slipper, or a bunch of keys; her zeal was so active in these barbarous inflictions that her invention was wonderfully quick, and some way of inflicting the requisite torture was soon found.*

He went on to comment:

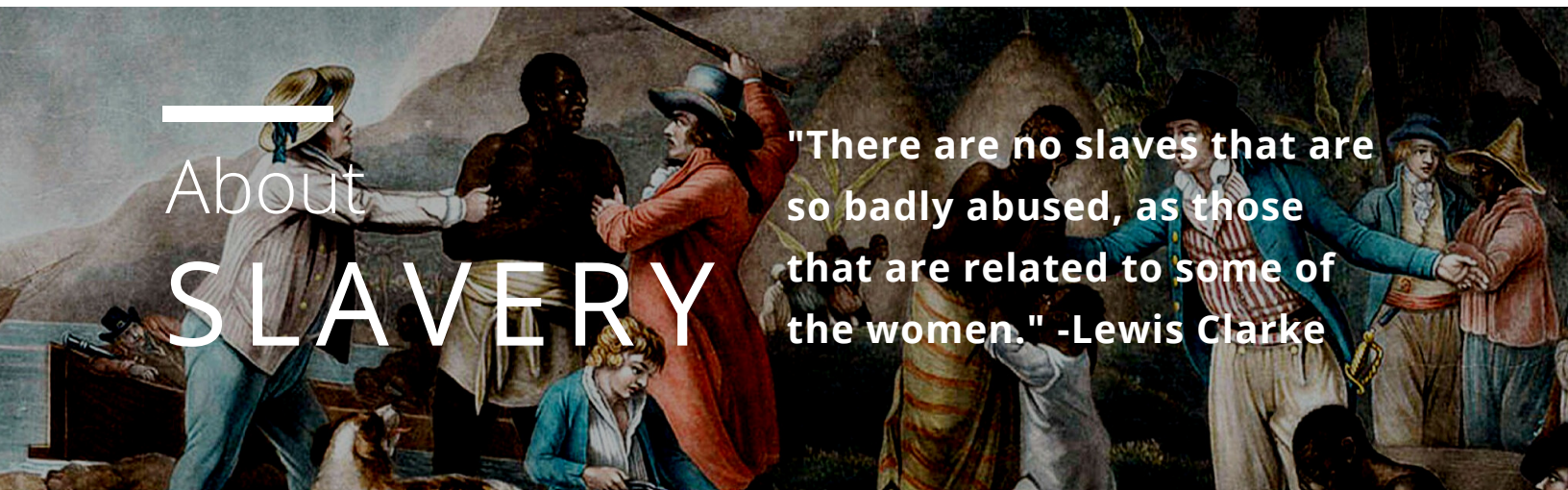
*Mrs. Banton [my mistress], as is common among slave-holding women, seemed to hate and abuse me all the more, because I had some of the blood of her father in my veins. There are no slaves that are so badly abused, as those that are related to some of the women, or the children of their own husband; it seems as though they never could hate these quite bad enough.*

The exact number of slaves fathered by their masters is unknown, but rape of enslaved females was common<sup>(37)</sup>. Originally circulated in 1805 to educate the public about slavery, Injured Humanity also vividly depicts the horrors of enslavement, detailing the destruction of families, the practices of floggings and the branding of enslaved persons, and the inhumane conditions of their lives.<sup>(38)</sup>

About

SLAVERY

"There are no slaves that are so badly abused, as those that are related to some of the women." -Lewis Clarke



# THE HARM REPORT

*Continued*



**Figure 2:** Scars of Gordon, whipped slave, 1863; Rare Historical Photos: [www.historicalphotos.com](http://www.historicalphotos.com)

The photo to the left depicts Gordon, an enslaved African who escaped the plantation in 1863 to join the Union Army to fight for the liberty of other enslaved Africans.<sup>(39)</sup> Upon escaping behind Union lines, pictures of his back were taken to show the brutality of slavery.

Gordon was captured by the Confederate Army and beaten so badly that he was left for dead.

However, he was able to find his way back to Union Lines. Gordon, became a sergeant in the Corps d'Afrique, and fought valiantly in the Siege of Port Hudson.

After the Civil War freed slaves were promised '40 acres and a mule' by Union General William T. Sherman. Less than a year after Sherman's proclamation, however, President Andrew Johnson intervened and ordered the vast majority of confiscated land be returned to its former owners. Other provisions and local government policies further made occupation of the confiscated lands infeasible for the recently freed Blacks.<sup>(40)</sup>

As slavery was instrumental to the southern economy, *many slave owners got reparations after the ending of the Civil War*. To ease slaveowner's pain, the District of Columbia Emancipation Act paid those loyal to the Union up to \$300 for every enslaved person freed. Commissions were established to oversee the process of compensation in other states, with more than 3,100 former slaves owners compensated payments totaling approximately \$930,000 – or almost \$25 million in today's currency.<sup>(41)</sup>

*Lynchings*. Although many historians believe the true number is much larger, from 1877 to 1950 the Equal Justice Initiative documented 4,384 lynchings.<sup>(42)</sup> Lynching was a tool used to enforce Jim Crow laws and racial segregation. Lynchings inflicted harm, not just upon the individual victims, but upon the entire African American community. These lynchings differed from ordinary murders, as they tended to draw large crowds of people who tortured victims, burned them alive, and dismembered them.<sup>(43)</sup>

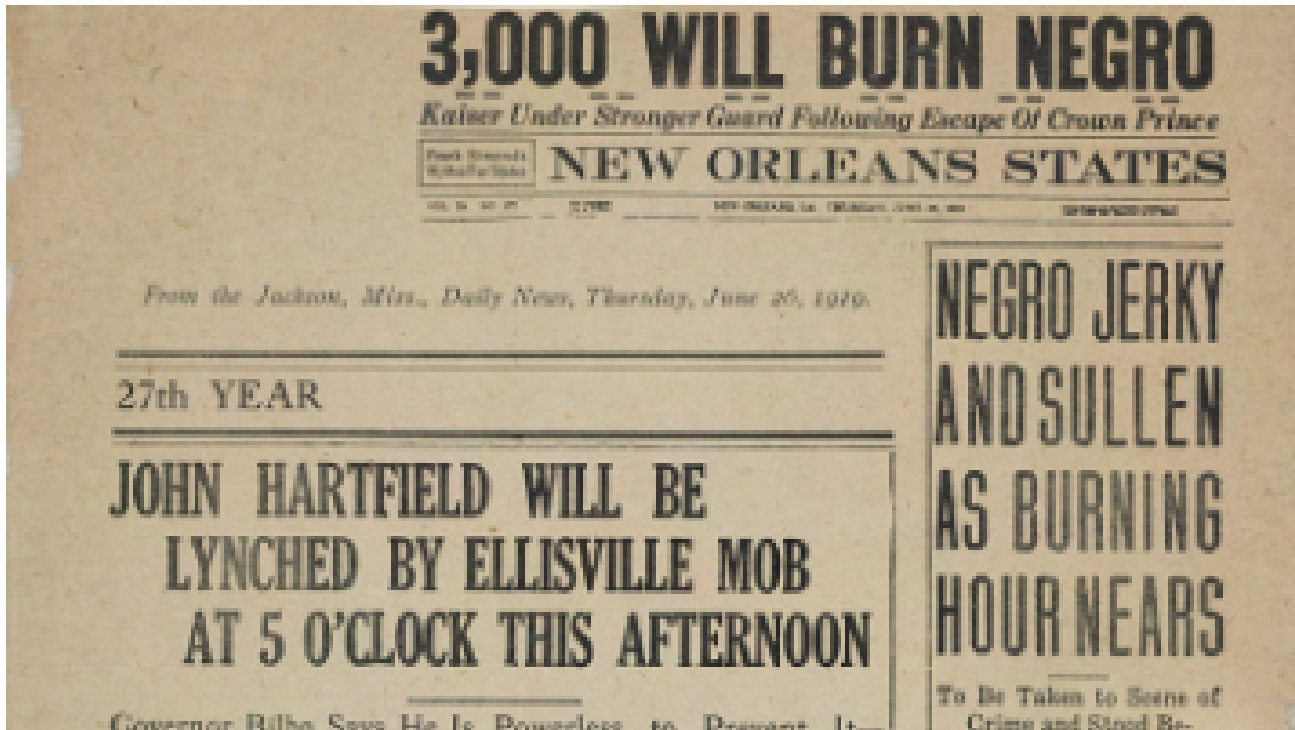


**Historians estimate that 30 million Africans were deported from different parts of Africa and enslaved.**



# THE HARM REPORT

*Continued*



**Figure 3:** From the Jackson Mississippi Daily News, Thursday, June 26, 1919

For example, John Hartfield was a black man who was lynched in Mississippi in 1919 for allegedly having a white girlfriend. The lynching was announced a day in advance in major newspapers (see clipping above), and a crowd of as many as 10,000 watched while Hartfield was hanged, shot, and burned. Pieces of his corpse were chopped off and sold as souvenirs. Days later a Black man in Perry County was also murdered by a mob because he mentioned Hartfield's death.<sup>(44)</sup>

In May, the same year Hartfield was lynched, a white plantation owner was killed in Georgia. When an angry group of citizens could not find the man accused of the murder, they killed several other Black men, including a man named Hayes Turner. Hayes' wife Mary vowed to get a warrant for the arrest of her husband's murderers, so the next day they came after her. Mary was about 20 years old and eight months pregnant. They strung her by her ankles on a tree, doused her with gasoline and motor oil, and set her afire. While Mary was badly burned, but still alive, a man stepped toward Mary with his knife and ripped open her abdomen. The prematurely born child tumbled to the ground and gave two feeble cries before the man stomped on the baby killing it.<sup>(45)</sup> It is estimated that between 5%-6% of all lynchings were of women, with many of the victims gang raped before being killed.<sup>(43)</sup>

Of all lynchings committed after 1900, only 1% resulted in a lyncher being convicted of a criminal offense. Most lynchings involved the killing of one or more specific individuals, but some lynchings targeted entire Black communities by forcing Black people to witness lynchings and demanding that they leave the area or face a similar fate. After a lynching in Forsyth County, Georgia, in 1912, white vigilantes distributed leaflets demanding that all Black people leave the county or suffer deadly consequences; so many Black families fled, such that by 1920, the county's Black population had plunged from 1,100 to just thirty.<sup>(42)</sup>



# THE HARM REPORT

*Continued*



**Figure 4:** Lynching of Jesse Washington, W.E.B. Du Bois photo essay, 1916

The publication of the lynching photo essay, “The Waco Horror” in 1916 that featured images of the lynching of Jesse Washington, a 17-year old Black teen, helped energize the anti-lynching movement. The first Anti-Lynching Bill was introduced into Congress in 1918, however, over 100 years later, with 200 different bills introduced over the years, there is still no federal legislation against lynching.<sup>(46)</sup>

## **2) STRUCTURES THAT PERPETUATE CYCLES OF DISADVANTAGE AND EXPERIENCES OF ADVERSITY AND TRAUMA**

Michelle Alexander, in her book *The New Jim Crow: Mass Incarceration in the Age of Colorblindness*, contends that the systems of oppression against African descendants employed in the United States went from enslavement, to Jim Crow, to implementation of laws addressing the war on drugs that has led to mass incarceration and restricted rights for an overwhelming number of African Americans.<sup>(47)</sup> While not all accept this proposition, the quote below from President Richard Nixon’s aide John Ehrlichman in an interview about the War on Drugs supports Alexander’s premise.<sup>(48)</sup>

*“We knew we couldn’t make it illegal to be either against the war or black, but by getting the public to associate the hippies with marijuana and blacks with heroin, and then criminalizing both heavily, we could disrupt those communities. We could arrest their leaders, raid their homes, break up their meetings, and vilify them night after night on the evening news. Did we know we were lying about the drugs? Of course we did.”*

**“ ...Getting the public to associate the hippies with marijuana and blacks with heroin, and then criminalizing both heavily, we could disrupt those communities. ”**

# THE HARM REPORT

*Continued*

Since 1970 the incarcerated population in the United States has increased by 700%,<sup>(49)</sup> such that there are currently approximately 2.2 million people behind bars.<sup>(50,51)</sup> The United States has the highest prison population in the world; accounting for 25% of the world's prison population despite the US only comprising 5% of the world's total population.<sup>(50)</sup> It is estimated that approximately half of all prisoners are serving time for drug offenses,<sup>(51)</sup> with nearly 90% of drug violations for possession, not sales or manufacturing.<sup>(52)</sup> In addition, while African descendants are estimated to make up 13% of all drug users, they comprise 35% of those arrested for drug offenses, and 46% of those convicted on drug charges.<sup>(51)</sup> Harsher sentencing laws related to crack cocaine versus powder cocaine, with crack cocaine more prevalent in the Black community and powder cocaine used more among Whites,<sup>(53,54)</sup> contributed to these racial disparities. Adding to the growing prison population, marijuana arrests increased from 2001 to 2010, such that they came to account for nearly half of all drug arrests.<sup>(55)</sup> Despite 33 states and DC having legalized marijuana for medical purposes<sup>(56)</sup>, marijuana possession can still result in felony charges in all but ten states.<sup>(57)</sup> While statistics again suggest rates of marijuana use are comparable among Blacks and Whites, a Black person is 3.73 times more likely to be arrested for marijuana possession than a White person.<sup>(55)</sup> These disparities, and other systemic biases in the criminal justice system which have been detailed elsewhere,<sup>(58)</sup> has led to a burgeoning of the incarceration of Blacks, such that it is currently estimated that one in three African American men will be incarcerated at some point in their lives.<sup>(50,51)</sup>

**Figure 5: Mass Incarceration and the Cycle of Disadvantage**

### **Impact on Father:**

- **Loss of right to vote and serve on juries**
- **Restricted ability to obtain employment, housing, and public benefits**
- **Separation from family**

### **Impact on Mother:**

- **Separation from loved one; single parent**
- **Difficulty meeting basic needs;**
- **Food and housing insecurity**
- **Need to work multiple jobs**

**Impact on Child: Live in socioeconomically disadvantaged neighborhood with: poorer quality schools, concentration of environmental hazards, including lead, few outdoor spaces to play, and higher rate of crime and community violence**

# THE HARM REPORT

*Continued*

Much as African descendants were forced into segregated, second-class citizenship in the Jim Crow era, once released after a felony offense, which could have been for possessing small amounts of marijuana, formerly incarcerated persons are often denied the right to vote, excluded from juries, and restricted in their ability to obtain employment, housing, and public benefits.<sup>(47)</sup> The cycle of disadvantage inflicted by imprisonment, however, affects more than just the formerly incarcerated person (see Figure 5). Nearly half of state prisoners (47%) and more than half of federal prisoners (57%) report having at least one minor child.<sup>(59)</sup> Fathers comprise 91% of the parents in prison,<sup>(59)</sup> and nearly half of all parents in prison lived with their children prior to incarceration.<sup>(59)</sup> Among minor children of parents in state prison, 1% are younger than age 1, about 18% are ages 1 to 4, 33% are 5 to 9, and 48% are 10 or older.<sup>(59)</sup> For these children, access to parents is often limited during incarceration as 62% of parents in state prisons and 84% of parents in federal prisons are locked up more than 100 miles from their last residence.<sup>(51)</sup> Nearly 2 in 3 (65%) families with an incarcerated family member experience difficulties meeting their basic needs, with approximately half (49%) reporting frequent bouts of food insecurity.<sup>(60)</sup> Children whose fathers are incarcerated also move more frequently and live in neighborhoods that are more socioeconomically disadvantaged than their peers whose fathers have never been in prison.<sup>(61)</sup> Socioeconomically disadvantaged neighborhoods are associated with poorer quality schools, a concentration of environmental hazards, including lead, fewer safe outdoor spaces for children to play, and higher rates of crime and community violence.<sup>(62)</sup> Mothers with a partner who is incarcerated are also more likely to work multiple jobs,<sup>(61)</sup> adding additional stress to the family environment. The cycle of disadvantage associated with parent incarceration is compounded significantly by all these factors.

However, even when African American families transcend the cycle of disadvantage propagated by government and societal policies and practices, privilege does not guarantee they can keep their children safe. There are countless examples of this one could tell; the story of Representative Lucy McBath as reported by CNN is one that is all too familiar and vividly depicts every African American parent's worst nightmare.<sup>(63)</sup> It was reported:

Representative Lucy McBath vividly remembers having “the talk” with her teenage son Jordan in 2012 after 17-year-old Trayvon Martin was shot and killed.

*“I said, ‘Baby, you got to understand. You are a young, Black male, and there are people in this country that are not going to care about you or love you like us, your family, your community,’” the Democratic congresswoman from Georgia recalled.*

It’s the conversation no parent wants to have, but so many Black mothers and fathers across this country feel it is a must.

*“You have to be really careful where you are, what you do. Don’t get into any verbal confrontation with anyone .. People will take out a gun and they will shoot you.’ And I remember Jordan had said, with that bravado, ‘Mom, that’s not going to happen to me.’”*

Just nine months later, that’s exactly what happened to him. Jordan was shot three times, killed by a White man at a gas station who was angry that Jordan and his friends were playing loud music. At 17, he was the same age as Martin.



# THE HARM REPORT

*Continued*

The toll of each heinous murder across the generations transcends family lines and compounds the impact of historical trauma on all African descendants.

### 3) ADVERSITY AND NEGATIVE HEALTH OUTCOMES

Adverse Childhood Experiences, or ACEs, were first defined in a now classic paper published in 1998 by Anda, Felitti, and colleagues.<sup>(5)</sup> In the initial study and much of the subsequent research, ACEs were defined as experiences of child maltreatment and other family problems (e.g., separation or divorce, incarceration of a family member). As depicted in Table 1, the past two decades of research have demonstrated that ACEs are associated with increased risk for a broad range of negative social outcomes,<sup>(4-9)</sup> psychiatric and substance use disorders,<sup>(10,12,64)</sup> health risk behaviors,<sup>(4-6)</sup> and medical health problems.<sup>(5,13,14,15,16)</sup> Even after controlling for socioeconomic factors and health risk behaviors, the effect of ACEs on numerous medical health outcomes is significant.<sup>(5,13-17)</sup>

**Table 1: Negative Outcomes Associated with ACEs**

Adverse Social Outcomes	Psychiatric Disorders	Health Risk Behaviors	Medical Health Problems
Educational failure	Posttraumatic Stress Disorder	Smoking	Obesity
Absenteeism from school	Depression	Overeating	Diabetes
Unemployment	Anxiety disorders	Physical inactivity	Heart disease
Absenteeism from work	Psychosis	Alcohol and drug use	Liver disease
Teen pregnancy	Substance use disorders	Sexual intercourse with multiple partners	Respiratory problems
Incarceration	Suicide attempts		Cancer

The original family-focused ACEs were derived in studying a predominantly white upper middle class cohort. Research conducted in more socioeconomically and racially diverse urban populations have highlighted the importance of examining both the traditional ACEs and expanded community-focused ACEs (e.g., racism, witnessing violence, living in an unsafe neighborhood).<sup>(65,66)</sup> In particular, racism and perceived discrimination are now also recognized as key factors contributing to health disparities between Blacks and Whites<sup>(67-70)</sup>. Perceived discrimination has been found to be a potent predictor of negative health outcomes and health disparities, even after taking into account income, education, and other measures of stress.<sup>(67)</sup> Discrimination is hypothesized to “get under the skin” and increase risk for the broad range of negative mental and physical health outcomes associated with the traditional ACEs through similar biological mechanisms, including stress, brain, epigenetic, and immune system mechanisms.<sup>(70,71)</sup>

### 4) TRANSGENERATIONAL EPIGENETIC INHERITANCE: KEY CONCEPTS

Genetic inheritance is a basic principle of genetics that explains how characteristics are passed on from one generation to the next. Genetic inheritance occurs due to genetic material, in the form of DNA, being passed from parents to their offspring. The DNA from the male is carried in the sperm, and the DNA from the female is carried in the egg.

“ Perceived discrimination has been found to be a potent predictor of negative health outcomes and health disparities... ”

# THE HARM REPORT

*Continued*

When the egg and the sperm unite they form a single cell which will have to multiply and make all the different cell types required for life. Every cell in the body has the same DNA, but different genes are turned on in different cells, making, for example, a neuron different than a cardiac muscle cell. The blueprint for each different cell type is programmed through *epigenetic mechanisms* – chemical modifications to the DNA that change its three-dimensional shape and the likelihood of a given gene product being turned on or off. These instructions are hard-wired and essential for normal development.

Epigenetic mechanisms are also one of the ways experiences of trauma and adversity get “under the skin.” Methylation – the addition of a carbon atom with three hydrogen atoms to DNA – is known to shut off genes when added to the beginning of the gene sequence. One of the most highly replicated findings in the field of epigenetics research is that experiences of early life stress can lead to methylation of the glucocorticoid receptor (GR) gene. The glucocorticoid receptor helps to turn off the stress response, and methylation of the GR gene is associated with reduced number of glucocorticoid receptors and heightened stress reactivity.<sup>(72)</sup>

Whether or not these environmentally induced, non-hardwired epigenetic modifications can be inherited and transmitted across generations is an active area of research. Studies of transgenerational epigenetic inheritance are hard to execute in humans as it is difficult to obtain multigenerational cohorts and exclude psychosocial (e.g., poverty) and cultural (e.g., racism) confounders that may lead to common epigenetic, behavioral, and health outcomes across generations.<sup>(26,73)</sup> A growing body of animal research, however, suggests the effects of traumatic stress and other negative exposures (e.g., chemicals) can be transmitted to subsequent generations through epigenetic mechanisms.<sup>(74-87)</sup>

For the environmentally induced epigenetic modifications to be inherited across generations, they must be contained in the germline – the sperm or the egg -- as these are the only two cells used to create subsequent life. Transgenerational epigenetic inheritance of traumatic stress and other negative exposures (e.g., chemicals) requires: 1) epigenetic modifications in the exposed animal/individual be present in the germline (e.g., sperm, egg); 2) epigenetic modifications in the exposed animal/individual be causally linked to the negative outcomes associated with the exposure; 3) the negative outcomes associated with the exposure be evident in subsequent generations with no history of exposure; and 4) the presence of the negative outcomes in the subsequent generations be causally linked to the epigenetic modifications initiated in the first exposed generation.

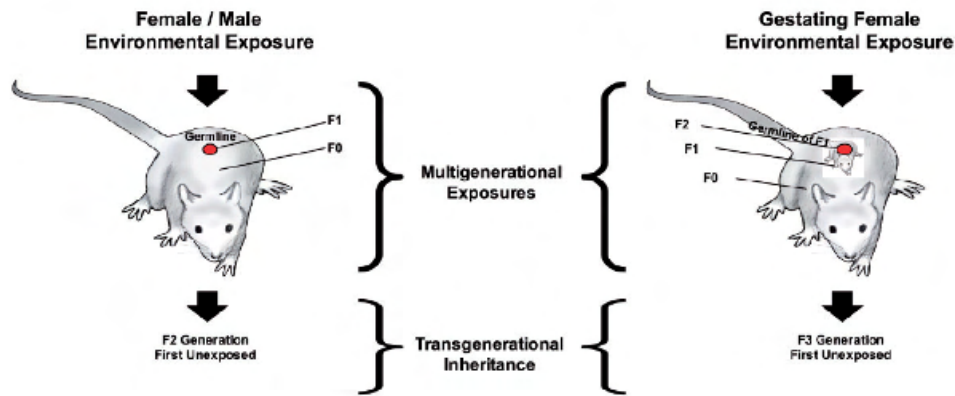


Generational  
**TRAUMA**

**Epigenetic mechanisms are also one of the ways experiences of trauma and adversity get “under the skin.”**

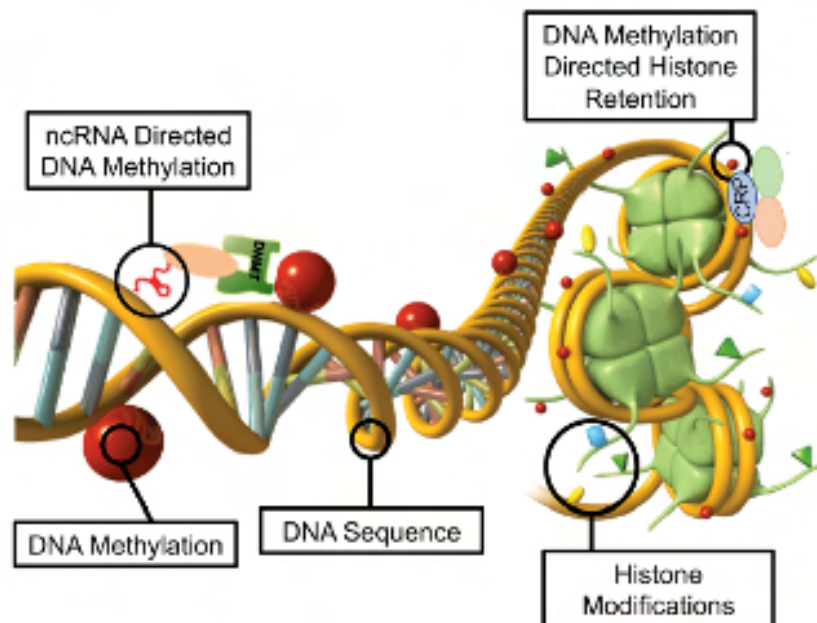
# THE HARM REPORT

*Continued*



**Figure 6:** Diagram from Nilsson et al.<sup>(88)</sup>

The diagram above depicts the experimental paradigm used to investigate transgenerational epigenetic inheritance in animals.<sup>(88)</sup> The male or female that has the initial negative environmental exposure is labelled the F0 generation. As the impact of exposure can lead to epigenetic modifications to the germline (e.g., sperm, egg) of the F0 generation that creates the F1 generation, the F1 generation is considered ‘exposed’ as well. Transgenerational inheritance cannot be examined until the F2 generation. If as depicted on the right side of the diagram, the female is pregnant at the time of exposure, she (F0) is exposed; her developing baby (F1) is exposed, and its germline and the subsequent offspring (F2) is also considered exposed. The F3 generation (e.g., great grandchild) would then be the first unexposed offspring in which transgenerational inheritance could be examined.



**Figure 7:** Epigenetics diagram adapted from Beck et al.<sup>(89)</sup>

The three forms of epigenetic modifications linked most frequently to transgenerational inheritance include: methylation, as discussed previously; histone modifications; and the action of non-coding RNA molecules (ncRNA; see diagram above).<sup>(89)</sup> Histones are the proteins that act as spools to wind DNA, and chemical modifications to histones can also affect gene regulation. While RNA molecules are best known for their role in coding proteins; ncRNAs can also act as epigenetic factors and impact gene regulation.<sup>(88)</sup>

# THE HARM REPORT

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Although evidence of transgenerational inheritance has been reported through the female germline,<sup>(90)</sup> most transgenerational inheritance studies have focused on examining epigenetic factors in sperm due to the relative ease of obtaining large numbers of sperm cells for analyses. Eggs cannot be readily obtained or acquired in large enough quantity for traditional molecular analysis. Currently more research is needed using evolving single-cell analytic techniques to fully elucidate the role of the female germline (e.g., eggs) in epigenetic inheritance.<sup>(88)</sup>

Because sperm develop behind a protective barrier, there was skepticism about the capacity for environmental exposures to elicit epigenetic modifications in sperm. Recently three independent teams were able to demonstrate that extracellular vesicles could transmit information about environmental stress and other adverse exposures to sperm, leading to epigenetic modifications that could be transmitted intergenerationally.<sup>(91-93)</sup>

Skepticism about transgenerational epigenetic inheritance also flourished in the past as methylation and histone epigenetic marks are known to be erased after fertilization so the cells of the evolving embryo can be totipotent – capable of transforming into all the different cell types required for life.<sup>(27,28,80)</sup> It has since been established that erasure and reprogramming is not complete,<sup>(85,88,92,94,95)</sup> and as discussed in the following section, methylation and histone epigenetic marks appear to be involved in facilitating experience-dependent transgenerational inheritance.

## Transgenerational Epigenetic Inheritance: Research Review

Rodent studies that have reported epigenetic modifications in the germline (e.g., sperm) that are causally linked to the outcomes associated with different exposures have examined the impact of: stress,<sup>(82,83,92,96-98)</sup> a high fat diet,<sup>(99-101)</sup> and multiple chemical exposures.<sup>(75,77,78,85,89,90,102-105)</sup> Many of these studies, however, only provide evidence of multigenerational transmission (see Figure 6). Select studies that provide evidence of true transgenerational inheritance – with the impact of ancestral exposures evident in subsequent generations with no history of exposure -- are reviewed below.

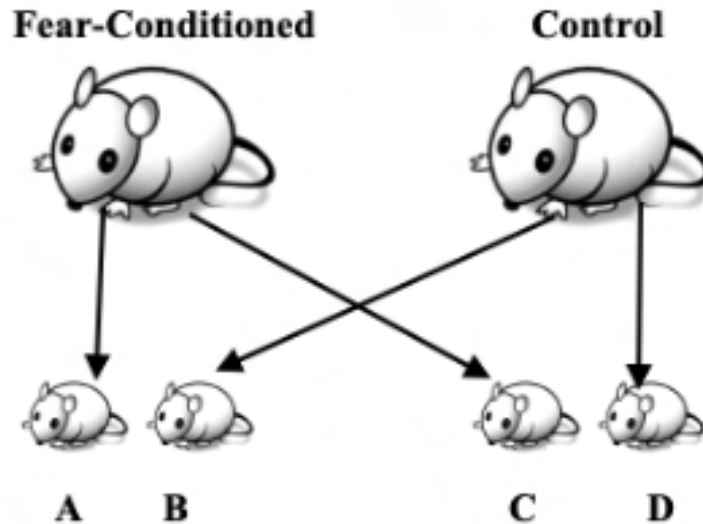
Fear conditioning is an animal model used to approximate exposure to traumatic stress. An innocuous stimulus, like an odor, is paired with a shock, so that with time the odor alone will elicit fear. Dias and Ressler<sup>(96)</sup> subjected F0 mice to odor fear conditioning before conception and found that subsequently conceived F1 (e.g., children) and F2 (e.g., grandchildren) generations had an increased behavioral sensitivity (e.g., fear) to the F0-conditioned odor, but not to other odors, despite no prior exposure to the odor or shocks. F0 mice subjected to fear conditioning and their F1 offspring were also found to have epigenetic marks in their sperm in a gene critical to olfactory perception. Enhanced behavioral response to the F0-conditioned odor was also associated with alterations in brain regions involved in olfactory perception in the F1 and F2 generation offspring of F0 fear conditioned mice. These same neuroanatomical alterations were also observed in odor naïve mice generated using in vitro fertilization (IVF) with sperm from the F0 fear conditioned mice, suggesting the neuroanatomical changes to the olfactory system were transmitted through the male germline (e.g., sperm). Due to animal quarantine issues, however, behavioral studies could not be conducted with the IVF-generated offspring.

**“ Environmental stress and other adverse exposures [could be transmitted] to sperm, leading to epigenetic modifications that could be transmitted intergenerationally. ”**



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*Continued*



To determine if conditioned fear could be transmitted via the female, Dias and Ressler conducted a cross-fostering study using the design depicted in the above diagram.<sup>(96)</sup> Sexually naive female mice were conditioned with the odor (e.g., fear-conditioned) or left in their home cage (control). They were then mated with odor-naive males. Immediately after birth their offspring were then divided into the following groups: (A) offspring of the fear-conditioned mothers raised by the fear-conditioned mothers; (B) offspring of the control mothers raised by the fear-conditioned mothers; (C) offspring of the fear-conditioned mothers raised by the control mothers; and (D) offspring of the control mothers raised by the control mothers. The females were only exposed to the odor conditioning before mating, and never while pregnant, precluding in utero exposure. Offspring of the fear-conditioned mice, whether raised by fear-conditioned mothers, or raised by the control mothers, exhibited increased behavioral sensitivity (e.g., fear) to the F0-conditioned odor, suggesting conditioned fear (e.g., psychological distress) can be transmitted via the female germline as well.

Yao and colleagues examined the impact of ancestral and multigenerational stress on maternal weight gain, gestational length, maternal blood glucose levels, and offspring weight in a four generation study.<sup>(98)</sup> Pregnant rats in the first (F0) generation were exposed to stress from gestational days 12 to 18. In this study “stress” involved being put in a cramped container for 20 minutes a day and having to swim 5 minutes a day. The pregnant daughters (F1) and granddaughters (F2) of the F0 moms were either exposed to stress or left undisturbed (e.g., non-stressed). Outcomes were examined in each generation, including in great grandchildren (F3). Stress reduced maternal weight gain in the F0 cohort and each successive generation, decreased gestational length beginning in the F1 cohort, and increased maternal blood glucose levels by the F2 cohort. Decreased offspring weight was evident by the F1 cohort and greatest in the F3 offspring of transgenerationally stressed mothers.

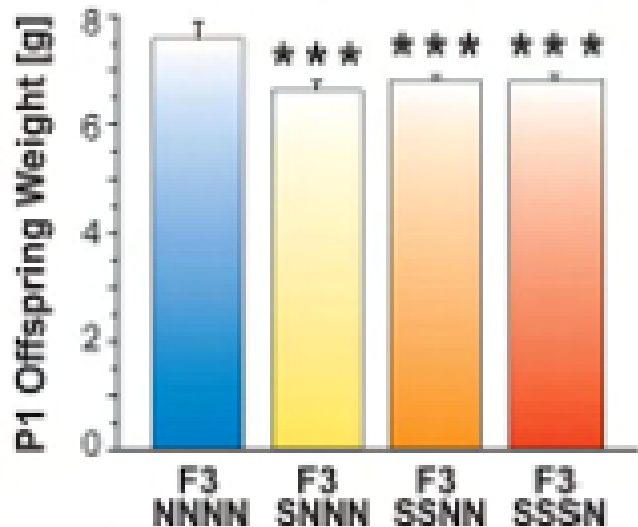
Ancestral  
**STRESS**

**Decreased offspring weight was evident by the F1 cohort and greatest in the F3 offspring of transgenerationally stressed mothers.**

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## Continued

As depicted in the diagram to the right, transgenerational and multigenerational prenatal stress resulted in low birth weight among F3 offspring. In the diagram NNNN indicates there was no stress across the four generations; SNNN indicates only F0 transgenerational stress, and SSNN and SSSN are indicative of multigenerational stress. In addition to the impact on birth weight, offspring of prenatally, multigenerationally, and transgenerationally stressed mothers were reported to exhibit developmental delays. Yao and colleagues also conducted brain frontal cortex, uterus, and placenta ncRNA and gene expression analyses in F0-N, F0-S, and F2-SSS animals, with results in F2 stressed animals demonstrating that a multigenerational history of prenatal stress is associated with changes in genes implicated in brain plasticity, parturition/childbirth, and preterm birth.<sup>(98)</sup>



The documentation of an impact of transgenerational and multigenerational stress on preterm birth is particularly interesting given racial disparities in rates of preterm birth, and recent findings that adequate prenatal care does not reduce racial disparities, with African American women who engage in adequate prenatal care still at elevated risk for preterm birth.<sup>(106)</sup>

de Castro Barbosa and colleagues showed that a high-fat diet could reprogram the epigenome of sperm and transgenerationally affect metabolism in the offspring.<sup>(100)</sup> In this study, F0 male rats were fed either a high-fat or normal chow-diet for 12 weeks and then mated to normal chow-fed females to create F1 and F2 generation offspring. Sperm were isolated from F0 and F1 males. The F0 male rats fed the high-fat diet had increased body weight and impaired glucose tolerance. The F1 (e.g., children) and F2 (e.g., grandchildren) offspring of the F0 males fed the high-fat diet had reduced birth-weight when compared to the offspring of chow-fed F0 males; and low birth-weight is a documented risk factor for obesity and type 2 diabetes.<sup>(107,108)</sup> F0 male rats fed the high-fat diet and their F1 male offspring had common sperm DNA methylation and small ncRNA expression signatures – with several of the epigenetic sites identified in genes implicated in the regulation of glucose homeostasis, insulin sensitivity, and a predisposition to Type 2 diabetes.<sup>(100)</sup> Consistent with these data demonstrating the role of a high-fat diet in programming the epigenome of sperm to affect the metabolism of the offspring, Grandjean and colleagues showed that microinjection of either testis or sperm ncRNA of male mice fed a high-fat diet into naive one-cell embryos lead to the establishment of the high-fat diet-induced metabolic phenotype (e.g., insulin resistance, impaired glucose tolerance) in the resulting progenies, whereas ncRNAs prepared from healthy controls did not.<sup>(101)</sup>

Skinner and colleagues have examined the transgenerational epigenetic inheritance of various health problems following exposure to the insecticide dichlorodiphenyltrichloroethane (DDT)<sup>(75,76,85,102,104)</sup> and a number of other environmental toxicants.<sup>(77,78,87,103,105)</sup> The research suggests ancestral exposure to DDT can promote obesity and associated diseases transgenerationally. In an initial study of the transgenerational impact of DDT exposure, gestating F0 female rats were exposed transiently to DDT at doses consistent with typical environmental exposures, and health outcomes were examined in F1 and F3 offspring.<sup>(104)</sup>

# THE HARM REPORT

## *Continued*

The F0 cohort was the only generation directly exposed to DDT. Both F1 and F3 offspring of F0 exposed rats developed several different pathologies (e.g., testes apoptosis, ovary disease, kidney disease), with the rates of having multiple diseases higher in both the F1 and F3 progeny than the offspring of controls. Elevated rates of obesity were also detected in 50% of the F3 offspring of the F0 exposed rats. F3 male sperm was also collected to examine methylation differences between the offspring of the F0 DDT exposed and control lineages, and multiple differentially methylated regions were statistically different between the two groups – including in regions containing genes that were previously associated with obesity.<sup>(104)</sup> In follow-up studies using the same experimental paradigm outlined above, more extensive analyses of epigenetic parameters were conducted on the sperm from adult males in the F1 (e.g. offspring), F2 (e.g., grand offspring), and F3 (e.g., great-grand offspring) generations.<sup>(85,89)</sup> Since the prior study observed DDT-related disease onset primarily between 6 and 12 months of age, sperm were collected at 3 months of age to avoid epigenetic-related disease artifacts. Robust methylation, histone modifications, and ncRNA alterations were evident in sperm from each generation, with the most distinct epigenetic marks evident in the F3 generation. The investigators proposed that the co-localization of many of the methylation, histone, and ncRNA alterations suggest the different epigenetic processes are integrated in mediating the epigenetic transgenerational inheritance of DDT-related pathologies. A similar pattern of findings involving methylation, histones, and ncRNAs emerged when examining the transgenerational epigenetic marks associated with vinclozolin, a fungicide used on fruits and vegetable crops.<sup>(78)</sup>

To the best of our knowledge, no rodent transgenerational studies have examined the impact of lead exposure, a major public health hazard for African American urban children, with profound and well-characterized developmental and behavioral implications across the lifespan.<sup>(109)</sup> Meyer and colleagues used zebrafish to study the transgenerational repercussions of lead exposure.<sup>(109)</sup> F0 embryos were exposed for 24 hours to waterborne lead. The F0 generation zebrafish were then raised to adulthood and F1 and F2 generation offspring, who had no direct lead exposure, were then studied. The dosage of lead exposure used in this investigation was previously found to generate learning impairments in zebrafish, and similar learning impairments were found to be present in the F2 offspring of F0 lead exposed zebrafish. RNA was extracted from the brains of the F2 offspring of control and lead-exposed F0 zebrafish. Significant expression differences were found in genes involved in brain development (e.g., synaptic function and plasticity, neurogenesis), endocrine homeostasis, and epigenetic processes -- genes which may be involved in lead-induced neurobehavioral deficits and/or their inheritance.

These data provide an initial step in demonstrating the potential transgenerational health effects of lead exposure.<sup>(109)</sup>

The observation by Dias and Ressler that in vitro fertilization with sperm from F0 fear conditioned mice generated offspring that had the same olfactory perception brain changes that were observed in the F1 and F2 generation offspring of F0 fear conditioned mice provides strong support that transgenerational epigenetic inheritance is transmitted through the male germline (e.g., sperm).<sup>(96)</sup> Comparable support for the role of the male germline in epigenetic inheritance has been reported in multiple other studies using similar methodology across fewer generations. For example, Gapp and colleagues injected sperm ncRNAs from males subjected to an early stress paradigm into eggs and produced offspring with the behavioral and metabolic alterations associated with their early stress experimental paradigm;<sup>(97)</sup> Rodgers and colleagues generated offspring with patterns of stress dysregulation observed in mice subjected to their chronic stress paradigm by microinjecting a zygote with sperm ncRNAs altered by the chronic stress protocol;<sup>(84)</sup> and Chan and colleagues produced offspring with neurodevelopment and stress reactivity indices similar to their stress-treated animals using

# THE HARM REPORT

*Continued*

assisted reproductive technology with sperm from naïve adult male mice that was incubated with extracellular vesicles from stress-treated animals.<sup>(92)</sup>

The biological relevance of the genes regulated by the epigenetic marks identified in the studies of transgenerational epigenetic inheritance also provides compelling support for the role of these mechanisms in the transmission of experience-dependent traits and health problems. To review, the F0 mice subjected to fear conditioning using an odor and their F1 offspring were found to have epigenetic marks in their sperm in a gene critical to olfactory perception.<sup>(96)</sup> A multigenerational history of prenatal stress which promoted reduced gestational length and developmental delays in the offspring was associated with changes in genes implicated in brain plasticity, parturition/childbirth, and preterm birth.<sup>(98)</sup> F0 male rats fed the high-fat diet and their F1 male offspring had epigenetic alterations in genes implicated in the regulation of glucose homeostasis, insulin sensitivity, and a predisposition to Type 2 diabetes,<sup>(100)</sup> and F3 male offspring of the F0 DDT exposed animals who had a 50% rate for the development of obesity had methylation changes in DNA regions containing genes that were previously associated with obesity.<sup>(104)</sup>

There is also emerging data suggesting the relevance of this research for understanding the transgenerational transmission of the effects of adversity and other negative exposures in human cohorts. Beyond the epidemiological studies which suggest parental exposure to trauma and stress, inadequate nutrition, and toxicants can impact the health of descendants across several generations,<sup>(26-28)</sup> several investigators have documented the presence of the epigenetic marks noted in the rodents in human samples. For example, alterations in the ncRNAs reported in the sperm of mice subjected to maternal separation have been observed in the serum (e.g., blood) of children aged 7-12 years of age who experienced paternal loss and maternal separation, the serum of adult men aged 18-25 years of age who likewise experienced paternal loss and maternal separation at a young age, and the sperm of adult men aged 21-50 years of age who experienced two or more significant traumatic events in childhood.<sup>(97,110)</sup> In another study, male adults with a history of early life stress exhibited reduction in a ncRNA (e.g., miRNA-434) in sperm that was also reported to be altered in a mouse model of early life stress.<sup>(111)</sup> The finding of alterations in this particular ncRNA in the sperm of adults with histories of early life stress was also replicated in an independent sample.<sup>(110)</sup> Experiences of recurrent stress in healthy adult males was also found to be associated with changes in ncRNAs detected in sperm that were identical to the ncRNA changes reported in a mouse study of chronic stress in adult animals.<sup>(112)</sup>

While more work is needed to fully elucidate the mechanisms by which experience can alter the epigenome and impact health and developmental trajectories in subsequent generations, the accumulating body of evidence is quite compelling. The role of the female germline in transgenerational epigenetic inheritance requires further investigation, but the cross-fostering study by Dias and Ressler,<sup>(96)</sup> and the four-generation pregnancy stress investigation by Yao and colleagues,<sup>(98)</sup> suggest specific germline (e.g., egg) epigenetic parameters will likely be identified when new emerging single-cell analytic technologies are used to study the role of the female germline (e.g., eggs) in epigenetic inheritance.<sup>(88)</sup> Elucidation of the molecular mechanisms involved in environmentally induced epigenetic transgenerational inheritance is essential to fully understand disease etiology,<sup>(85)</sup> and has important implications for the development of novel prevention and treatment interventions to mitigate the negative impact of deleterious ancestral exposures.



**Experiences of recurrent stress in healthy adult males was also found to be associated with changes in ncRNAs...**





# THE HARM REPORT

*Continued*

## 6) FACTORS THAT MITIGATE THE EFFECTS OF HISTORICAL AND PERSONAL TRAUMA

The transgenerational negative effects demonstrated in the animal studies reviewed in the prior section can be prevented. Animal studies showing ways to mitigate the deleterious effects of the various exposures on the F0 and subsequent generations are highlighted in this section, with parallel and other promising human interventions also discussed.

In the initial study by Dias and Ressler,<sup>(96)</sup> the pairing of an odor with a shock (e.g., fear conditioning) was used to model the effect of traumatic stress in the F0 and subsequent generations. In a follow-up experiment, the same procedures were used, but a subset of the animals were provided “treatment” to eliminate the elicitation of fear by the odor.<sup>(113)</sup> “Treatment” was comprised of extinction training – the gradual elimination of the conditioned response (e.g., fear when presented with the odor) by repeat presentation of the odor without any shocks. Animals that were initially conditioned to fear the odor and then provided “treatment” stopped exhibiting fear when exposed to the odor. Their offspring (F1) also did not show increased behavioral sensitivity (e.g., fear) to the F0-conditioned odor. In addition, the epigenetic changes observed in the sperm in the gene critical to olfactory perception was only evident in the mice conditioned to fear the odor and not provided any “treatment;” the mice that received extinction training (e.g., treatment) did not have these epigenetic marks in their sperm. It appears “treatment” can prevent the transgenerational transmission of the negative effects associated with ancestral traumatic stress.

Extinction training is at the core of all evidence-based psychotherapeutic approaches for treating Posttraumatic Stress Disorder (PTSD) in children, adolescents, and adults, with talking about and visualizing the traumatic events (e.g., repeat exposure) paired with relaxation training and cognitive processing.<sup>(114-116)</sup> These interventions are highly effective in diverse populations for a broad range of traumatic experiences (e.g., sexual abuse, intimate partner violence, community violence, traumatic loss of a loved one). Work is also currently underway to incorporate into these trauma-informed practices methods to address racial trauma and acknowledge of the systems of oppression that perpetuate it.<sup>(117,118)</sup>

de Castro Barbosa and colleagues showed that a high-fat diet could reprogram the epigenome of sperm and transgenerationally affect metabolism in the offspring.<sup>(100)</sup> An independent group using a similar mouse model demonstrated that diet or exercise interventions for 8 weeks in obese males prior to conception prevented the development of metabolic problems (e.g., insulin sensitivity, excess adipose tissue) in the offspring.<sup>(119)</sup> Paternal diet and exercise also prevented changes to sperm ncRNAs. We are not aware of comparable multigenerational obesity interventions in humans, but these animal studies suggest preconception diet and exercise programs may help to break the transmission of obesity and associated negative health outcomes (e.g., diabetes, cardiovascular disease, cancer, and premature mortality). There is, however, a plethora of data that suggests adopting a healthy lifestyle can diminish an individual's risk for obesity and these other health problems. Reducing intake of red meat,<sup>(120,121)</sup> consuming plant protein over animal protein,<sup>(122)</sup> having regular portions of fruit,<sup>(120,121)</sup> eating foods rich in antioxidants or taking antioxidant supplements,<sup>(123,124)</sup> refraining from excessive alcohol use,<sup>(120,121)</sup> and engaging in mindfulness-based stress reduction

**It appears “treatment” can prevent the transgenerational transmission of the negative effects associated with ancestral traumatic stress.**

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are all associated with longevity and reduced risk of these stress-related health problems. As food deserts – areas lacking in affordable healthy foods – are concentrated in minority neighborhoods,<sup>(127)</sup> federal efforts to enhance access to quality foods through the Healthy Food Financing Initiative, which provides incentives for healthy food retailers to open stores in areas lacking access to nutritious fresh food, may be an important first step in addressing the obesity epidemic in the Black community.<sup>(128)</sup> Available data, however, suggests that access alone is not always sufficient to improve residents' diets,<sup>(128-130)</sup> indicating additional targeted interventions are required.

Many of the other deleterious transgenerational effects reviewed in the prior section were found to be prevented when, after the initial negative exposures, the F0 cohort was provided enrichment experiences (e.g., living in enhanced spaces that included toys to provide rich social, physical, and sensory experiences). For example, female mice subjected to prenatal stress who were subsequently provided enrichment experiences did not experience preterm birth and their offspring did not show any developmental delays,<sup>(131,132)</sup> male mice subjected to early stress who were provided enrichment experiences did not exhibit the sperm epigenetic changes associated with the early stress paradigm and there was no transmission of any stress-related behavioral symptoms to their offspring,<sup>(133)</sup> and providing enrichment experiences to females exposed to lead while gestating prevented the development of lead exposure-related deficits in the cognitive performance of their offspring.<sup>(134)</sup>

There are multiple examples of educational enrichment programs promoting resilience and a range of positive outcomes in impoverished youth. The Harlem Children's Zone educational programs have been found to increase kindergarten readiness, reduce racial gaps in academic achievement, and reduce incarceration rates among males and pregnancy rates among females.<sup>(135)</sup> Early childhood programs, like the Carolina Abecedarian Project, has shown similar positive outcomes with benefits noted in the next generation as well. The Carolina Abecedarian Project, which was rigorously evaluated using a randomized controlled trial treatment design, provided full-time, high quality educational intervention in a childcare setting from infancy to age 5, and the offspring of program participants were found to have fewer school suspensions, less criminal behavior, and greater educational attainment and employment relative to the children of participants in the control condition.<sup>(136)</sup> Positive benefits have also been demonstrated with programs targeting older youth, like the Stanford Medical Youth Science Program which provides academic enrichment in the medical sciences and college admissions support to very low-income minority high school students, most with poor academic preparation.<sup>(137)</sup> Of the more than 400 youth who have completed the program, 99% have been admitted to college, 81% have earned a four-year college degree, and among four-year college graduates, 52% are attending or have graduated from medical or graduate school.

Participation in team sports is also associated with resilience, specifically, reduced mental health problems among youth with histories of significant childhood adversities.<sup>(138)</sup> Youth Sport and Arts for Resilience (Youth SOAR) is an innovative program being implemented on Chicago's southside which aims to reduce levels of youth violence, strengthen youth resilience to violence, and increase youth's sense of belonging to a positive peer

“ There are multiple examples of educational enrichment programs promoting resilience and a range of positive outcomes in impoverished youth. ”

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group.<sup>(139)</sup> Youth SOAR trains, mentors, and supports older youth in implementing weekly sports and arts activities with younger local youth, who are then responsible for organizing additional community engagements with other local youth.<sup>(139)</sup> This gives the youth, not only the opportunity to participate in sports and arts programming, but also the chance to demonstrate leadership, experience being trusted by authority figures, and appreciated for their contribution to the community.

In our research, the availability of positive support from parents and/or other adults has consistently been found to be the most important factor in promoting resilience and recovery in maltreated and other vulnerable children. Among these high risk/high adversity youth, the availability of a parent or other significant adult support was found to decrease risk for the development of depressive disorders,<sup>(140)</sup> minimize the likelihood of hypothalamic pituitary adrenal stress axis abnormalities,<sup>(140)</sup> significantly reduce the vulnerability conferred by high risk genes associated with psychopathology,<sup>(141,142)</sup> and ameliorate the negative impact of adversity on the functioning of brain circuits involved in threat processing and emotion regulation.<sup>(143)</sup>

The Strong African American Families (SAAF) intervention is an evidence-based intervention developed for 11-year-old youth which is designed to enhance the parent-child relationship and also address issues unique to African American youth (e.g., racial socialization, racism). The developers of SAAF have also created programs for older youth, and programs to enhance parenting relationships.<sup>(144-148)</sup> SAAF was initially developed for youth from low-income families from disadvantaged neighborhoods in rural Georgia; however, it is currently being implemented in urban communities around the nation,<sup>(149,150)</sup> including 24 social services agencies in Harlem.<sup>(151)</sup> SAAF consists of seven consecutive 2.5-hour weekly family group meetings held at community facilities, with separate skill-building curricula for youths and their primary caregivers. The caregiver sessions emphasize positive parenting skills, including the consistent provision of instrumental and emotional support, high levels of monitoring and control, adaptive racial socialization strategies, and methods for communicating about sex and alcohol use. Youth sessions focus on forming goals for the future and making plans to attain them, resistance efficacy skills, and adaptive behaviors to use when encountering racism. At SAAF meetings, families eat a meal together and then divide into small parent and child discussion groups. For the final hour of each session, the caregivers and youth reunite for a two-generation group meeting.

The SAAF program has been associated with positive outcomes on child behavioral problems, health risk behaviors, health problems, and number of physiological indices. Specifically, SAAF participation has been associated with decreased rates of conduct problems in youth two years after the intervention;<sup>(152)</sup> reduced rates of smoking,<sup>(153)</sup> drinking,<sup>(154)</sup> drug use,<sup>(155)</sup> and risky sexual behaviors<sup>(156)</sup> in late adolescence and early adulthood; and reduced risk of obesity<sup>(157)</sup> and prediabetes in young adulthood.<sup>(158)</sup> In the latter study, adverse childhood experiences were not associated with risk for prediabetes in young adults who participated in the SAAF intervention, but among the youth in the control intervention, each additional experience of adversity was associated with a 37% increase in risk for prediabetes.<sup>(158)</sup> In terms of physiological indices, the SAAF intervention was associated with reducing the impact of family risk factors on stress system (e.g., adrenaline, norepinephrine),<sup>(159)</sup> inflammation,<sup>(160)</sup> and epigenetic<sup>(161,162)</sup> markers. The parenting-focused SAAF intervention was also associated with diminishing the impact of poverty on hippocampal and amygdala brain volumes measured in adulthood—key brain regions affected by stress.<sup>(163)</sup>

“ Among these high risk/high adversity youth, the availability of a parent or other significant adult support was found to decrease risk for the development of depressive disorders... ”

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The investigators note their findings are consistent with a possible role for supportive parenting in brain development, and appear to suggest a strategy for narrowing social disparities.<sup>(163)</sup>

While additional studies are needed,<sup>(164)</sup> there is a growing body of research suggesting that Afrocentric culturally-adapted prevention and treatment interventions are especially effective in addressing a range of different risks and promoting positive outcomes in African descendants.<sup>(165-171)</sup> Afrocentric approaches address themes of historical trauma stemming from enslavement to Jim Crow to the mass incarceration of Black individuals, and experiences of collective disenfranchisement and persistent racial disparities.<sup>(164, 168)</sup> To build pride and promote empowerment, Afrocentric interventions shift away from Western/Eurocentric approaches and aim to enhance cultural identity and re-instill traditional African cultural values -- including an emphasis communalism – the sense of shared responsibility for each other and one’s community.<sup>(164,169,171,172)</sup> There is also a focus on Traditional African Healing Systems in some programs, such as those promoted by the Ausar Auset Society International, a Pan African Spiritual organization with the mission of using the knowledge of indigenous African cultures, history, and spiritual traditions to restore the people of African descent.<sup>(173)</sup> In addition to incorporating culturally-specific beliefs into treatment, some recently evaluated Afrocentric interventions also address risk factors specific to descendants from Africa, promote preferred coping behaviors, including the use of spirituality, and employ only African American clinicians for treatment.<sup>(174)</sup>

## 7) POLICY, PRACTICE, AND RESEARCH RECOMMENDATIONS

Addressing the key structures in American society that perpetuate cycles of disadvantage and ongoing experiences of adversity and trauma for African descendants is critical. This report began with a reference to the murder of George Floyd. Police reform is essential to addressing systemic racism in this country. Key legislation currently under consideration to address police reforms includes: H.R. 1280, George Floyd Justice in Policing Act of 2021;<sup>(175)</sup> H.R. 1347, Eric Garner Excessive Use of Force Prevention Act of 2021;<sup>(176)</sup> S.353, End Police Use of Chokeholds Act of 2021; H.R. 1163, Federal Police Camera and Accountability Act;<sup>(177)</sup> and S.597, End Racial and Religious Profiling Act of 2021.<sup>(178)</sup> These bills collectively are designed to increase police accountability, restrict the use of deadly force, and reduce racial bias in policing. As 22%-40% of deaths due to the use of lethal force by law enforcement are mental health related,<sup>(179)</sup> S.4441, Crisis Assistance Helping Out On The Streets Act or the CAHOOTS Act,<sup>(180)</sup> is designed to allow states to access Medicaid monies to replicate the successful CAHOOTS program. CAHOOTS has been operating in Eugene Oregon since 1989 providing effective crisis intervention for persons who are homeless or struggling with mental illness or addiction, and responds to approximately 17% of the Eugene police department’s overall total call volume.<sup>(181)</sup>

To date, research has only been conducted on one program developed to address police bias, the Ethical Policing is Courageous (EPIC) program. EPIC is a peer-intervention program that was designed by the New Orleans Police Department to improve policing in response to a federal consent decree—a mandate from the U.S. Department of Justice outlining sweeping reforms the department must adopt to correct a history of civil rights abuses, with the shooting of several unarmed African American citizens setting the consent decree in motion.<sup>(182)</sup> The training of New Orleans officers in EPIC resulted in fewer complaints against officers, a 93% drop



**Police reform is essential to addressing systemic racism in this country.**





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in the use of serious force, rates of interactions with police described as pleasant and courteous increasing from 53% to 87%, and a drop in homicide rates to a 47-year low.<sup>(182-184)</sup> More research, however, on the effectiveness of the EPIC program and other practices to decrease policing bias are needed. This is especially true in light of recent data from the New Orleans Police Department which shows the racial disparity between its stops, searches, and arrests of Black subjects and other races has grown, despite EPIC training and ongoing federal oversight.<sup>(185)</sup>

The next event discussed in this report was the Black Wall Street Massacre. On the anniversary of the massacre, the Biden-Harris Administration announced new actions to build black wealth and narrow the racial wealth gap.<sup>(186)</sup> Key in the initiative are plans to address housing discrimination and other barriers to home ownership, develop federal contracts with minority businesses, and support community revitalization, including plans to replace 100% of this nation's lead pipes and service lines.<sup>(187)</sup> This initiative, however, is up against the backdrop of 250 new laws being proposed in 43 states to limit voting, which has been described as "the most sweeping contraction of ballot access in the United States since the end of Reconstruction, when Southern states curtailed the voting rights of formerly enslaved Black men."<sup>(188)</sup> This flurry of new laws to restrict voting access is particularly troubling since in 2013 the Supreme Court struck down a key component of the Voting Rights Act of 1965, freeing states to change their election laws without advanced federal approval,<sup>(189)</sup> and the Supreme Court's recent decision to uphold two Arizona voting restriction laws that were challenged in the lower courts.<sup>(190)</sup>

The next main topic discussed in this report was the criminal justice system, and how racial biases in the system perpetuate a cycle of disadvantage for African American families. In 2018 The Sentencing Project submitted a report to the United Nations on racial disparities in the U.S. criminal justice system.<sup>(58)</sup> Key recommendations from that report included: ending the war on drugs, eliminating minimum sentences, and developing and implementing training to reduce racial bias. Again, as noted earlier in this report, much as African descendants were forced into segregated, second-class citizenship in the Jim Crow era, once released after a felony offense formerly incarcerated persons are often denied the right to vote, excluded from juries, and restricted in their ability to obtain employment, housing, and public benefits.<sup>(47)</sup> Children whose fathers are incarcerated are also more likely to live in neighborhoods that are socioeconomically disadvantaged,<sup>(61)</sup> with socioeconomic disadvantaged neighborhoods associated with poorer quality schools, a concentration of environmental hazards, including lead, fewer safe outdoor spaces for children to play, and higher rates of crime and community violence.<sup>(62)</sup> The cycle of disadvantage associated with parent incarceration is compounded significantly by these and the other factors discussed earlier in this report. Ending the biases in the criminal justice system that restrict the rights of African descendants and compounds adversity for families is also critical to addressing systemic racism in this country.

H.R. 40, Commission to Study and Develop Reparation Proposals for African Americans Act proposes:

*To address the fundamental injustice, cruelty, brutality, and inhumanity of slavery in the United States and the 13 American colonies between 1619 and 1865 and to establish a commission to study and consider a national apology and proposal for reparations for the institution of slavery, its subsequent de jure and de facto racial and economic discrimination against African Americans, and the impact of these forces on living African Americans, to make recommendations to the Congress on appropriate remedies, and for other purposes.*

# THE HARM REPORT

*Continued*

The Equal Justice Initiative has suggested that national commemorations of atrocities inflicted on African descendants is an important step toward establishing trust between victims and the governments and legal systems that failed to protect them, and that meaningful public accountability is a critical step to bring the cycle of racial violence to a close.<sup>(42)</sup> A report prepared for the United Nations High Commissioner for Human Rights entitled *Promotion and protection of the human rights and fundamental freedoms of Africans and of people of African descent against excessive use of force and other human rights violations by law enforcement officers* was released June 2021. It delineates a comprehensive agenda to reverse cultures of denial, dismantle systemic racism and accelerate the pace of action; end impunity for human rights violations by law enforcement officials and close trust deficits in this area; ensure that the voices of people of African descent and those standing up against racism are heard and that their concerns are acted upon; and acknowledge and confront legacies, including through accountability and redress.<sup>(191)</sup>

The data reviewed in this document and the recent United Nations report make clear that racial discrimination continues to severely impact African descendants in the United States to this day.<sup>(191)</sup> Racism is not restricted to the emboldened acts of a few extremists, it is embedded in the structures of our society. The extant data on transgenerational epigenetic inheritance strongly suggest that racial trauma and ancestral adversities can negatively impact descendants across multiple generations. These negative effects, however, are not inevitable. Interventions, healthy lifestyles, and positive enriching experiences can help to mitigate the effects of historical trauma and other lifetime negative exposures.

The mechanisms by which experience can alter the epigenome and impact health and developmental trajectories in subsequent generations are not fully understood. More basic (e.g., animal) and clinical research is needed. The National Institute of Health is preparing to launch a ten year longitudinal study, the Healthy Brain and Child Development (HBCD) study, which will recruit 7,500 children prenatally and assess parents and children comprehensively across a broad range of domains, including the collection of biospecimens for epigenetic analyses. It is the hope that the HBCD study will help to provide a much clearer picture than ever before of the developmental outcomes of structural racism and poverty in the first decade of life, and how brain development and child health correlate with family circumstances, environmental toxins such as secondhand smoke and lead, physical activity, school quality, nutrition, and other social-environmental factors.<sup>(190)</sup> Incorporating epigenetic analyses in adoption studies and multigenerational longitudinal investigations will also help to advance work on the transgenerational epigenetic inheritance in human cohorts.

More research, however, is *not* required to document the need to address the impact of centuries of systemic racism. The pandemic shined a spotlight on racial disparities in this country, and the death of George Floyd and others highlighted the unfinished work yet to be completed for racial equality to be achieved. The cost to the individual and to society of systemic racism is enormous. The time to act is now.



Structural  
RACISM

More research, however, is  
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# POST SCRIPT TO THE HARM IS TO OUR GENES

*from the desk of N'COBRA Health Commission*



## African Centered Healing Is Essential to Our Health and Well-being

### N'COBRA Health Commission

If we as African Americans are ever to heal our community from the deleterious epigenetic and traumatic consequences of enslavement, Jim Crow apartheid and colonialism, we must first boldly confront, overturn, and disentangle ourselves from the epistemes that uphold the fallacies of white superiority. And toward that end it is imperative that we take agency over our own bodies, which includes accessing our own healing systems.

Western medicine has been used historically as a tool of power, as a weapon against Africans and other oppressed people, to advance European imperialist designs.<sup>(1)</sup> Western medicine is based on the premise that Eurocentric scientific analysis is absolute, and that its concept of medicine is the only framework in which medicine should operate. In most cases it asserts a monopoly on truth. {Richardson, Epidemic Illusions 5-6}.<sup>(2)</sup>

We understand the foundation of western medicine is based on the premise of white superiority, which actively engages in the denigration of the humanity of African people.<sup>(3)</sup> From Benjamin Rush,<sup>(4)</sup> who described Black skin as being caused by leprosy and who is considered the father of modern day psychiatry (his image was only recently removed from the logo of the American Psychiatric Association (APA) in 2015).<sup>(5)</sup>; to Samuel Cartwright<sup>(6)</sup>, a prominent 19th century doctor who wrote that Black people were biologically built for slavery and who characterized our desire for freedom as a disease (drapetomania) to be cured by whipping or amputating toes; to J. Marion Simms<sup>(7)</sup>, the father of gynecology who violently experimented on enslaved African women and children, forbidding anesthesia because Blacks women, he said, didn't feel pain<sup>(8)</sup>; to Richard Herrnstein, one of the authors of the Bell Curve<sup>(9)</sup>, which stated that African people were scientifically intellectually inferior to white people; to the American Psychiatric Association's response to the urban rebellions of the sixties in the rebranding of schizophrenia as a violent disease of the threatening, angry Black man. (Recently, the 176 year old organization issued an apology.<sup>(10)</sup> for its racist past)<sup>(11)</sup> - western medicine gave scholarly license to the racial terrorism committed against African American bodies and our psyche.

As African people, we cannot dispel or deny this truth, nor normalize the power dynamic that systems of oppression have over the oppressed.

In contrast to the Western school of medicine, the African medical praxis views the world as a unified body

# POST SCRIPT TO THE HARM IS TO OUR GENES

*from the desk of N'COBRA Health Commission*

where things are understood in terms of the collective effort, and whereby healing is communal.<sup>(12)</sup> This framework holds that healing is grounded in both flesh and spirituality, involving every aspect of one's life, and that it takes on many forms. Thus, healing from transgenerational epigenetic inheritance and transgenerational transmission of trauma, where the injury is projected into the future of our progeny, will require involvement from every aspect of African American society to create a new epistemological, liberatory health praxis in Black America with the ultimate goal of empowerment. As Karanja Keita Carroll and DeReef F. Jamison so presciently intimated in "African-Centered Psychology, Education and the Liberation of African Minds: Notes on the Psycho-Cultural Justification for Reparations," healing for Black people must be African centered and liberatory, and "must have a transformative function in the lives of African people, by functioning as a mechanism of social change and it must also attack all that which is an affront to African existence."<sup>(13)</sup>

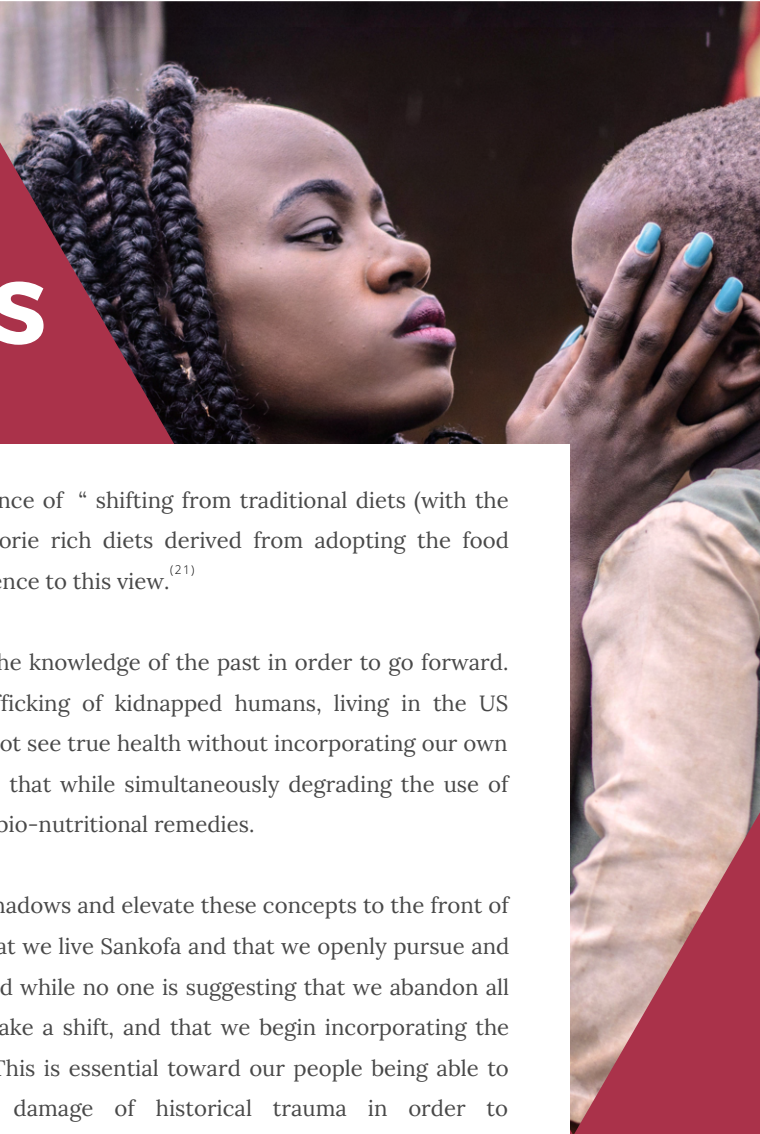
Currently, there is a growing call afoot for African Americans and all oppressed people to decolonize our minds, and decolonizing healthcare is a part of that call.<sup>(14)</sup> In addition to the work of the Ausar Auset Society International<sup>(15)</sup> that was mentioned earlier in the Report, the Community Healing Network, in partnership with the Association of Black Psychologists, have been active around the country. As a result, their Emotional Emancipation Circles are on the rise.<sup>(16)</sup> This movement has to a large extent been propelled by the healing works of people such as Amos Wilson, Dr. Joy DeGruy, Dr. Franz Fanon, and more. These are just a couple of initiatives that have already begun. Clearly, however, African American society needs a greater more comprehensive, all-encompassing approach that involves all sectors of our society – the clergy, educators, students, medical practitioners, scientists, artists and everyday people to create the necessary healing pathways.

In the African tradition, there is also a nutritional component to healing trauma, as the study of epigenetics is illuminating the multidimensional benefits of nutrition<sup>(17)</sup>. Western medicine is slowly recognizing that food is so much more than the transfer of energy and vital nutrients throughout the body, but that it is also able to affect the genome and the very genetic expression of our descendants for generations to come.<sup>(18)</sup>

Africa, as the cradle of human civilization, has the longest history of the domestication of plants for food and medicine in the world and is home to the richest microbial diversity on the planet.<sup>(19)</sup> Africa has a rich history in the healing arts, in which plants, energy, and minerals are used medicinally.<sup>(20)</sup> This system is known as Traditional African Medicine (TAM), Prior to European colonialism, TAM influenced a large percentage of the world. The colonial imposition of western medicine, along with its food and dietary choices has been a major attack on African indigenous knowledge systems. The many studies on the deleterious health effects on Africans who adopt a Western lifestyle, defined by Maurice M. Iwu, a professor of Pharmacognosy in Nigeria,



*POST SCRIPT TO*  
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*from the desk of Onaje Muid*



and head of the country's COVID task force, as a consequence of “ shifting from traditional diets (with the protective functional foods from the forests) to more calorie rich diets derived from adopting the food systems of the more developed countries,” gives added credence to this view.<sup>(21)</sup>

Sankofa is a Ghanaian word which means we must retrieve the knowledge of the past in order to go forward.

Clearly, as African descendants of the Transatlantic trafficking of kidnapped humans, living in the US disconnected from our African knowledge systems, we will not see true health without incorporating our own knowledge systems of healing. We must also acknowledge that while simultaneously degrading the use of TAM, Big Pharma has made billions<sup>(22)</sup> appropriating Africa's bio-nutritional remedies.

As Black people it is time that we pull TAM from out of the shadows and elevate these concepts to the front of our medical lexicon and healing practice,. It is imperative that we live Sankofa and that we openly pursue and receive the inheritance of the vast knowledge of Africa. And while no one is suggesting that we abandon all that we have learned in the US, it is imperative that we make a shift, and that we begin incorporating the African part of our identity into every aspect of our lives. This is essential toward our people being able to powerfully mitigate the psychological and epigenetic damage of historical trauma in order to transgenerationally transmit health and the fullness of Africa's treasures to our progeny well into the future.

Finally, we repeat the Charge of Genocide as William Patterson presented in his petition to the United Nations in 1951, seventy years ago. Therefore we DEMAND REPARATIONS NOW.<sup>(23)</sup>

**Convention on the Prevention and Punishment of the Crime of Genocide**  
 Article II

In the present Convention, genocide means any of the following acts committed with intent to destroy, in whole or in part, a national, ethnical, racial or religious group, as such:

- a. Killing members of the group;
- b. Causing serious bodily or mental harm to members of the group;
- c. Deliberately inflicting on the group conditions of life calculated to bring about its physical destruction in whole or in part;
- d. Imposing measures intended to prevent births within the group;
- e. Forcibly transferring children of the group to another group.

  
 Lisa Davis

  
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