

# Finding Health by Looking in the Right Place

*How Understanding What Actually  
Creates Health Can Fix U.S. Healthcare*

*By: R. Lawrence 'Larry' Moss, MD, FACS, FAAP*



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# Foreword

*Finding Health by Looking in the Right Place* offers the reader lessons on many dimensions. The title itself indicates that health represents an active process — that it is one nurtured and cultivated by discovery, that it has roots in our environments, and that organizations that fly the health care flag highest don't generally offer the best prospects for its attainment.

That these blended insights are set out by the CEO of a major pioneering pediatric healthcare system is no surprise to those who know Larry Moss. From my first meeting with Larry, he's talked about the gap between what creates health and how our healthcare system operates. He's also talked about the challenge, given the incentives embedded in the nation's health financing systems, of shifting our orientation from a sickness system to a health system.

A few years back, this successful pediatric surgeon, who performed some of the most complex surgeries, changed his career trajectory by becoming the CEO of Nemours Children's Health, a multistate children's health system. As a board member at the time, I was particularly pleased that Larry joined our team and, since then, I've been even more pleased with the sustained vision and leadership he has delivered.

Through decades of real-world experience as a pediatric surgeon, Larry has come to believe that hospitals must shift from being in the business of providing medical care to being in the business of creating health. And that by starting with children's hospitals, America can and will raise a healthier generation of adults. It is now very clear that the first years of life are critical in shaping an individual's life course, for better or for worse, and that, as a nation, we are woefully underinvested — in attention and funds — to take advantage of that knowledge. As a result, whether using a health index or a productivity index, we are underperforming.

At no time has that been more clear than in the past three years of the COVID-19 pandemic, when both our well-being and our economic security were placed at risk, with a toll that was much higher than it needed to be, and a burden more cruelly crushing to our most vulnerable than should ever occur in a just society.

Larry Moss believes to his core that a nation is only as strong as its children and, therefore, that its future depends on having our children grow up healthy to be productive adults. Larry knows that changing our nation's approach to health requires updating our collective understanding of health. The following essays are a testament to Larry's ability to make discussions about health and health care more accessible.

He brings to life how “health is all around us” by providing concrete examples of how health is created in everyday life. He also shows us how we can do better, not by paying more for medical care, but by paying greater attention to the resources already around us. The essays are not just opinions, but are full of useful references to existing programs that promote the creation of health.

At a certain level, the message Larry carries may seem obvious, but the fact is that few have been able to articulate this idea to audiences of key decision-makers beyond the medical profession. And even fewer have been able or willing to change how their institution operates to better align with what we know about creating health. At the helm of Nemours Children’s, Larry is leading a change that enlists every Nemours associate as a leader in the change process for creating health. And the commitment that he has fostered throughout Nemours is catalyzing change elsewhere. In Washington, D.C., Nemours initiatives have fostered discussions throughout the federal government on the vital contributions of the social determinants of health. And, on a home front Nemours is walking the walk. In the Delaware Valley they have created the Value Based Services Organization to provide cutting-edge changes in care delivery to create health in the population. In Florida, Nemours has led the charge to establish a new Health Equity Institute in Orlando with the support of the Ginsburg Family Foundation.

As a result of the strong leadership and commitment shown by Larry and his colleagues in the Nemours family, there is a quickening in the pace of possible change, but the road is long. Larry’s essays are ideal starting points for the critical conversations all Americans should be having. Discussions that do not require familiarity with medicine or policy, but which do impact millions of everyday decisions in homes, communities and institutions across the nation. Decisions that will help to transform health in America for generations to come. I thoroughly enjoyed reading his pieces and I am confident you will, too.

*Michael McGinnis, MD, MA, MPP  
Executive Officer and Senior Scholar  
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# Introduction

Did you know that America spends more than triple what our peer countries do on medical care, yet we have among the worst health indices of any country in the developed world?

After 40 years in healthcare as a volunteer, student, resident, attending surgeon, program and department leader, and now a health system CEO, I am frequently reminded of an old parable.

*Walking down a dark street, I saw a man on his hands and knees under a streetlight, desperately scanning the gutter and sidewalk with a look of frustration.*

*When I asked him what the trouble was, he let out a deep sigh. A look of utter despair came across his face, and he said, "I've lost my car keys and I've been looking for them for over an hour."*

*I asked the typical "foolish" question, "Where did you lose them?" He sighed again and looked at me sadly as he replied, "About four blocks away."*

*I asked the next "foolish" question, "Why are you looking for them over here?"*

*He looked at me like I had asked a stupid question and indignantly told me, "Because the light's better over here."*

Like the man looking for his keys where it's easiest to see but far from where he lost them, we seek health outcomes from a healthcare system that uses medical care alone to create and maintain health. The problem is that medical care only accounts for a small fraction of health (15–20% by most estimates). Other factors, including safe housing, a good education, safety, and a stable home, determine most of our health.

This e-book is about some of these factors. And, because the foundation for lifelong health is built before we reach adulthood, it's also about the importance of health to children.

I think that, to a greater degree than any other issue or factor, the future of America depends on whether we get children's health right today – so that tomorrow's adults are healthier, happier and more productive than ever.

And getting children’s health right requires America to look beyond simply paying for more medical care to investing in all of the factors that create health. In fact, our entire payment system is designed to deliver as much medical care as possible, not to promote health.

Unfortunately, if we became really good at preventing disease, our current healthcare system would go bankrupt, because it depends on hospital beds being filled by sick people and tests being done on those people. Our nation’s efforts to fix this misalignment of what we need (health) and what we end up paying for (treatments) have been overwhelmingly complex and ineffective, to say the least.

Fortunately, we can fix our healthcare system in three simple steps:

1. Understand Health
2. Pay for Health
3. Start With Children

All of us are busy. As a pediatric surgeon and the CEO of Nemours Children’s Health, I am grateful to be busy in the job of my dreams. Nemours is a microcosm of America. We serve patients from the most advantaged to the most disadvantaged backgrounds and everything in between. We operate in states with different regulations, political climates and cultural norms.

Every day, I have an opportunity to impact the lives of our patients, and I get to work with some of the most committed and passionate teammates in healthcare. I never forget that what happens in the examination rooms and corridors of our hospitals is secondary to what happens outside of our walls in the homes, communities and schools of our patients.

These essays represent my effort to arm you with information and ideas — so that you can confidently participate in discussions about health in America and support programs that will create more health for you, your family and your community.

### 3 Steps to Fixing Healthcare:

1. **Understand Health:** Medical care is only one driver of health. By addressing all of the drivers of health, we can get better results and stop over-spending.
2. **Pay for Health:** If our healthcare system paid health care providers and hospitals based on the health they created, not on the volume and complexity of services, they could create more health for more people more efficiently.
3. **Start With Children:** By focusing on children, when prevention and care is both less expensive and more effective, we ensure that next generation of adults is healthier, creating a virtuous cycle that drives down health care costs and strengthens the economy.

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Throughout this e-book, I use the term “health care” to refer to patient care and the services that create and maintain health.

I use the word “healthcare” when referring to the industry that supports the provision of health care services.

So, for example, I lead a healthcare system — Nemours Children’s Health — that employs many doctors, nurses, and other experts who provide health care to children.

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# PART I: The People Around Us

*People create health. Whether world-famous public figures or our closest friends, people have the power to make the world healthy.*

## The General and the Gift of a Good Start

In 2021, a remarkable man, whom I had the good fortune to meet several years ago, passed away due to complications from COVID-19.

General Colin L. Powell, USA (Ret.), was a passionate advocate for children. He was the founding chairman of The America’s Promise Alliance and served on the National Board of Governors of the Boys and Girls Clubs. A visit he made to the Boys and Girls Club of Delray Beach, Florida, in 1993 seemed to leave a lasting impact on him. Recounting it in his 2012 memoir, It Worked for Me: In Life and Leadership, General Powell offers this conclusion:

“You can leave behind you a good reputation. But the only thing of momentous value we leave behind is the next generation, our kids — all our kids. We all need to work together to give them the gift of a good start in life.”

Abundant research tells us that giving a child a good start doesn’t just benefit the child. It benefits all of us as the ripple effects of physical and mental health, education and productivity are felt across the economy. As I explained here (PDF), economists like James Heckman of the University of Chicago have found that investing in children yields exponentially high returns to society through reduced costs in education, health and justice system spending as well as through increased tax revenue. As Princeton economist Janet Currie explains, we have more than enough data to show that child health is “an important form of human capital. Healthier children live longer and healthier lives, get more education, and earn higher wages.”



Many of our children in America are not getting the good start they need to live to their full potential. Fortunately, America has the know-how and the resources to fix this. We just need to harness a character trait that General Powell had in spades: the will to act.

Time and time again, Colin Powell persevered. With dogged determination, he not only completed one physically and mentally challenging training course after another, but he also excelled. Though he considered himself an unremarkable athlete and student, he became an airborne ranger, was quickly and repeatedly promoted, led men through the jungle in Vietnam, and earned an MBA from The George Washington University, all by the time he turned 35. Based on his own accounts of his childhood, Powell grew up with a supportive family and access to high-quality education. He gives a great deal of credit to the City College of New York (CCNY), where he attended college and joined the ROTC. When he attended, CCNY's tuition was \$10 a year – significantly more affordable than his other option, a private university (which at the time was \$750 a year). Powell notes that the graduates of the college include a Supreme Court justice, two New York City mayors, nine winners of the Nobel Prize, and Dr. Jonas Salk, who discovered the polio vaccine.

Many of the challenges Powell describes are related to tests of physical and mental endurance and intellectual rigor. But one challenge he faced arose from the very country he loved and defended. During his military training and as an officer at bases across the Jim Crow South, Powell describes encountering overt, pervasive racism to a degree that he hadn't experienced growing up in New York City. "Racism," he wrote, "was not just a black problem. It was America's problem."

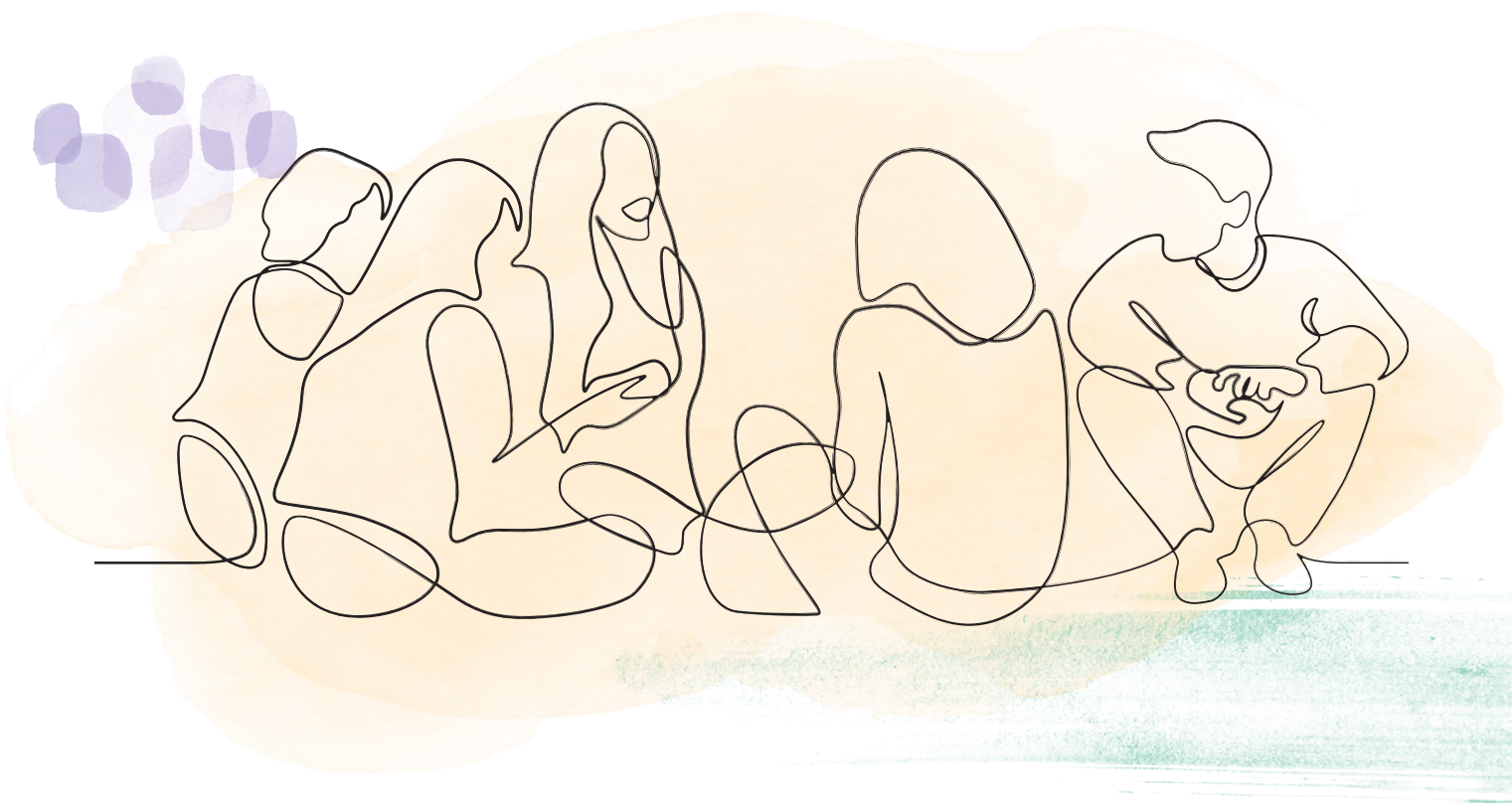
Today, decades after the repeal of Jim Crow laws, systemic racism perpetuates health disparities in childhood and into adulthood. The American Academy of Pediatrics details the impact of racism on child health in [\*this 2019 report\*](#), explaining that: "Racism is a social determinant of health that has a profound impact on the health status of children, adolescents, emerging adults, and their families. Although a small amount of progress has been made toward racial equality and equity, the evidence to support the continued negative impact of racism on health and well-being through implicit and explicit biases, institutional structures, and interpersonal relationships is clear."



When General Powell spoke at a Nemours pediatric conference on child health in 2018, he talked to us about his work with children’s initiatives and how his experience drove his passion for investing in education. He shared his concern about the alarming number of 18-year-olds who want to join the armed forces but cannot due to criminal records, drug use, obesity, or inadequate school performance. His words only strengthened my resolve, already well-formed after decades of work as a pediatric surgeon and researcher, that children’s hospitals have a critical role to play in improving health equity. Four days before hearing General Powell talk, I had become a health system CEO. I did this not to run a health system but to make Nemours the first health system in the business of creating health. Providing superb medical care is part of creating health, but a small part. Doing this well is only the beginning.

Many children’s hospitals were founded in the 19th and 20th centuries to deliver care to all children, regardless of race, gender, or ability to pay. In the 21st century, children’s hospitals are already at the forefront of this work, but we can and must do more to ensure that every child is given the gift of a good start. Children’s hospitals must take the lead by addressing the social determinants of health in communities across the nation through programs that improve access to medical care and education and remove barriers like systemic racism.

As General Powell said in his most recent memoir: “I am frequently asked why youth programs and education have become a priority in my life. My answer is very simple: I want every kid to get the chance I had.”



# Inspiration From Women for a Healthier 21<sup>st</sup> Century

The average American lifespan has increased dramatically. In 1900, *life expectancy* in the United States was 48 years. By 2020, it was 79 years. Initially, the increase was driven mainly by a *reduction in infant mortality*. Quality of life also improved for children, especially as protections we now take for granted were put in place, and cures or treatments for many diseases and conditions were discovered. Many of the Americans who drove these transformative changes were women. These doctors, social workers, government officials, researchers, scientists, teachers, and nurses encountered many barriers. We benefited greatly from their perseverance.

It's time we recognized more of the remarkable American women who helped shape life as we know it today. I would like to tell you about three women you may not have heard of who helped change the trajectory of life in America.

## **Dr. Rebecca Lee Crumpler**

In 1864, Dr. Rebecca Lee Crumpler (1831–1895) became the first African American woman in the United States to graduate from medical school. In addition to providing medical care to formerly enslaved Americans and others suffering from poverty after the Civil War, she wrote *A Book of Medical Discourses*. *Dr. Crumpler's book* has been described as “the forerunner to the famous *What to Expect When You're Expecting*.” It may be the first medical text written by an African American author. Given that the United States did not abolish slavery until 1865 and that women did not obtain the right to vote in all states until 1920, Dr. Crumpler's achievements and contributions are even more inspiring and worthy of celebrating.

Born in Delaware, not far from Nemours Children's Hospital, Dr. Crumpler died at age 64 in Boston, Massachusetts. Her home is a stop on the *Boston Women's Heritage Trail*.

## **Julia Clifford Lathrop**

President Taft appointed Julia Clifford Lathrop (1858–1932) in 1910 to serve as the first chief of the Children's Bureau in the Department of Commerce and Labor. She was the first woman to head a federal agency in the United States. The department enforced new laws against child labor at a time when many young children were forced to forgo an education to work in factories and fields. Under Lathrop, the Children's Bureau advanced maternal health funding, researched child health, and armed America's parents with up-to-date health information. In the 1940s, the *Children's Bureau* was folded into the Social Security Administration. Today, it is part of the Department of Health and Human Services.

The following remarks, which Lathrop delivered at the National Education Association convention more than 100 years ago, are relevant today:

“We cannot help the world toward democracy if we despise democracy at home, and it is despised when mother or child die needlessly. It is despised in the person of every child who is left to grow up ignorant, weak, unskilled, unhappy, no matter what his race or color.”

Julia Lathrop was born in Rockford, Illinois and died there at the age of 74. As historian Miriam Cohen explains, newspaper coverage of her death often quoted Lathrop’s friend and fellow social reformer Jane Adams, who described Lathrop as “one of America’s most useful women.”

### **Gertrude Belle Elion**

Gertrude Belle Elion (1918–1999) revolutionized the development of pharmaceuticals. She won a Nobel Prize for her work in 1988. At age 19, she graduated summa cum laude from Hunter College. Despite her high grades, Elion was initially rejected from graduate schools and research positions because of her gender. Fortunately for anyone who’s benefited from modern pharmaceuticals, Elion did not give up. Eventually, she was accepted into graduate school at New York University, which she attended while teaching high school.

When labs began hiring women out of necessity during the Second World War, Elion was hired by George Hitchings at Burroughs Wellcome (now GlaxoSmithKline). With Hitchings and her own team, Elion developed a breakthrough drug for leukemia, the first antiviral drug, and a drug used in organ transplantation. Even during her retirement, she advised the team that developed AZT, the first drug approved to treat AIDs. In addition to her Nobel Prize, Elion was awarded 23 honorary degrees and granted 45 patents. Gertrude Elion passed away in 1999, the last year of a century during which she had a direct and lasting role in shaping the health of our nation and the world.

Reading about women like Gertrude Elion reminds me that Nemours owes its very existence to a determined, visionary woman who cared deeply about children. A school administrator before marrying Alfred I. duPont, Jessie Ball duPont was largely responsible for creating the vision through which his wishes were carried out after his death. As the founding chair of the Nemours Foundation, she oversaw the creation of the Alfred I. du Pont Institute (now Nemours Children’s Hospital, Delaware). She stressed the importance of caring for the whole child and convened leaders from the public and private sectors to advance practices and policy.

Her work lives on today as Nemours conducts cutting-edge research, provides free health information via [KidsHealth.org](https://kidshealth.org), and advocates for government attention to child health at the highest levels of government.

In my role as Nemours CEO, I have the privilege of relating to Mr. duPont's vision in a unique way. I am charged with executing the vision of a truly remarkable man. In my opinion, Jessie Ball duPont is just as remarkable. She used her intellect, charisma, and every bit of the limited attention afforded to women leaders in her time to bring her husband's vision to life beyond what any reasonable person could have expected.

I asked Dr. Kara Odom Walker, our Chief Population Health Officer and the former Secretary of the Delaware Department of Health and Social Services, for her thoughts on women's history month and this article. As a Delaware native passionate about chemistry, medicine, and health equity, she said she feels connected to and inspired by women like Crumpler, Lathrop, Elion and duPont.

"Their visionary work in the 19th and 20th centuries is a model for the work we must do now to advance and improve life for all Americans in the 21st century — from advocating for a White House Office on Children and Youth to addressing the social determinants of health."

I couldn't agree more.



# The Power of Friendship

The relationships we build at every stage of life are critical to our health, well-being and even the economy.

Children spend their days in school and “grown-ups” spend our days in the office. For our children, the classroom is an opportunity to develop lifelong friends, social skills and confidence. For adults, workplaces offer opportunities to collaborate and build meaningful relationships. I was certainly energized by again working with more of my colleagues in person, as COVID-19 allowed. Shortly after returning to my office when COVID-19 restrictions allowed, I happened upon one of my closest colleagues. We had spoken via video dozens of times in the prior few months. Nevertheless, it still felt like a reunion with an old friend. There was a warmth and joy that cannot be achieved online.

## What is friendship?

Philosophers, politicians, authors, scientists and artists have explored this question for centuries. How should we understand the nonfamilial, nonromantic relationships that hold communities together, drive new ideas and solutions, ensure survival, and allow us to thrive?

According to the *Stanford University Encyclopedia of Philosophy*, friendship is “a distinctively personal relationship that is grounded in a concern on the part of each friend for the welfare of the other, for the other’s sake, and that involves some degree of intimacy.” The *Merriam-Webster Dictionary* defines a friend as “one attached to another by affection or esteem” and also explains the meaning of the word ‘friend’ in the context of social media — as in a person to whom you are connected on Facebook.

Pop culture reflects our insatiable interest in friendship. Some of the most successful and enduring television shows focus on a group of friends, like *Three’s Company*, *Cheers*, *The Golden Girls*, *Seinfeld*, *Living Single*, *Friends*, *Will and Grace*, *How I Met Your Mother* and *The Big Bang Theory*. Countless books about friendship, like those written by J.R.R. Tolkien in the 1930s, continue to capture our imaginations even today. I remember reading *The Hobbit* as a child and was delighted to learn that Tolkien’s literary ambitions were enriched by his *friendship with C.S. Lewis*.





If we seem to know instinctively that friendships are important, it may be because friendship is in our nature. Studies suggest that other mammals also show signs of friendship. Take chimpanzees. Jan Engelmann of the Max Planck Institute for Evolutionary Anthropology explains that: “Humans largely trust only their friends with crucial resources or important secrets. In our study, we investigated whether chimpanzees show a comparable pattern and extend trust selectively toward those individuals they are closely bonded with. Our findings suggest that they do indeed, and thus that current characteristics of human friendships have a long evolutionary history and extend to primate social bonds.” Studies of my favorite of all animals, dogs, have shown that dogs will choose bonding time with their human even over a tasty food treat.

Economists tend to consider friendship in relation to social capital, which “is often measured through participation rates in different types of associational life, and self-reported levels of trust.” Like human capital, which I explore here, social capital in childhood impacts our health and, as a recent study in the journal, Nature, suggests, our income in adulthood. For the study, researchers analyzed the social networks of 72.2 million people (a total of 21 billion friendships) using Facebook data. They found, as The New York Times explains, “that the degree to which the rich and poor were connected explained why a neighborhood’s children did better later in life, more than any other factor.” In other words, if most of your friends expect to attend college or pursue high-income careers, then you’re more likely to as well.

This research hits home for me. I grew up in a middle-income family in a small town in Oregon. Only a few of my relatives had attended college and no one in my sphere had gone to graduate school. However, we had many family friends who were doctors and lawyers and people with strong academic pedigrees. I suspect these associations were part of what set me on a trajectory to Yale, Stanford, and many fine institutions with which I’ve been privileged to be associated.

Given what researchers have learned about how our friendships impact our behaviors and feelings, this makes sense. Using data collected by the Framingham Heart Study, the authors of a 2007 study published in The New England Journal of Medicine found that: “The spread of obesity in social networks appears to be a factor in the obesity epidemic. Yet the relevance of social influence also suggests that it may be possible to harness this same force to slow the spread of obesity. Network phenomena might be exploited to spread positive health behaviors, in part because people’s perceptions of their own risk of illness may depend on the people around them.”

In 2008, the same researchers analyzed the Framingham data again. They found that happiness spreads through social networks, too, even considering the possibility that happy individuals may tend to associate with other happy individuals. According to the study, if a friend who lives a mile or less away from you becomes happy, you are 25% more likely to be happy.

Data gathered on individuals over their lifetimes as part of the *Harvard Study of Adult Development* suggests that: “Close relationships, more than money or fame, are what keep people happy throughout their lives. Those ties protect people from life’s discontents, help to delay mental and physical decline, and are better predictors of long and happy lives than social class, I.Q. or even genes. That finding proved true across the board among both the Harvard men and the inner-city participants.” A lack of protective, close relationships like friendships can undermine our health and the U.S. economy. The AARP estimates that social isolation drives \$6.7 billion in additional Medicare spending. Cigna estimates that loneliness among adults costs the U.S. economy \$406 billion annually. The good news is that there are many ways to foster friendships and combat isolation. As communities, we can support projects that increase shared space and programs that foster cross-generational connections. As individuals, we can proactively reconnect with old friends or join a social group. Research even suggests that social interactions with people who are acquaintances, rather than close friends, have a positive impact on well-being.

The United States is not alone when it comes to loneliness. At least two countries, Japan and the U.K., have designated Ministers of Loneliness. Other countries have established programs that help university students board in the homes of older adults. In a speech to the Red Cross, President Woodrow Wilson, whose friendship with Justice Louis Brandeis had a “consequential” impact on American politics, said that, “Friendship is the only cement that will ever hold the world together.”

I feel very fortunate to have consequential friendships of my own. I had the good fortune of attending high school with a remarkable group of friends. Seven or eight of us have remained close for over 40 years. We talk regularly, take vacations as “guy trips,” and as couples, and we still call on each other when we need support. We have all known each other longer than we have known our wives. I value these relationships more than words can describe.

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If you're interested in learning more about friendships and social capital, check out these resources:

- Use [this online tool](#) at Opportunity Insights, a Harvard-based nonprofit, to explore what researchers discovered about connectedness in your county and state.
- Take a virtual tour of the J. Paul Getty Museum exhibit "[Better Together](#)" to see how artists have depicted friendship across centuries and cultures.
- Visit [KidsHealth.org](#) from Nemours®, KidsHealth®, to read expert advice for [kids](#) and [teens](#) about friends and friendship.

# Part II: The Environment Around Us

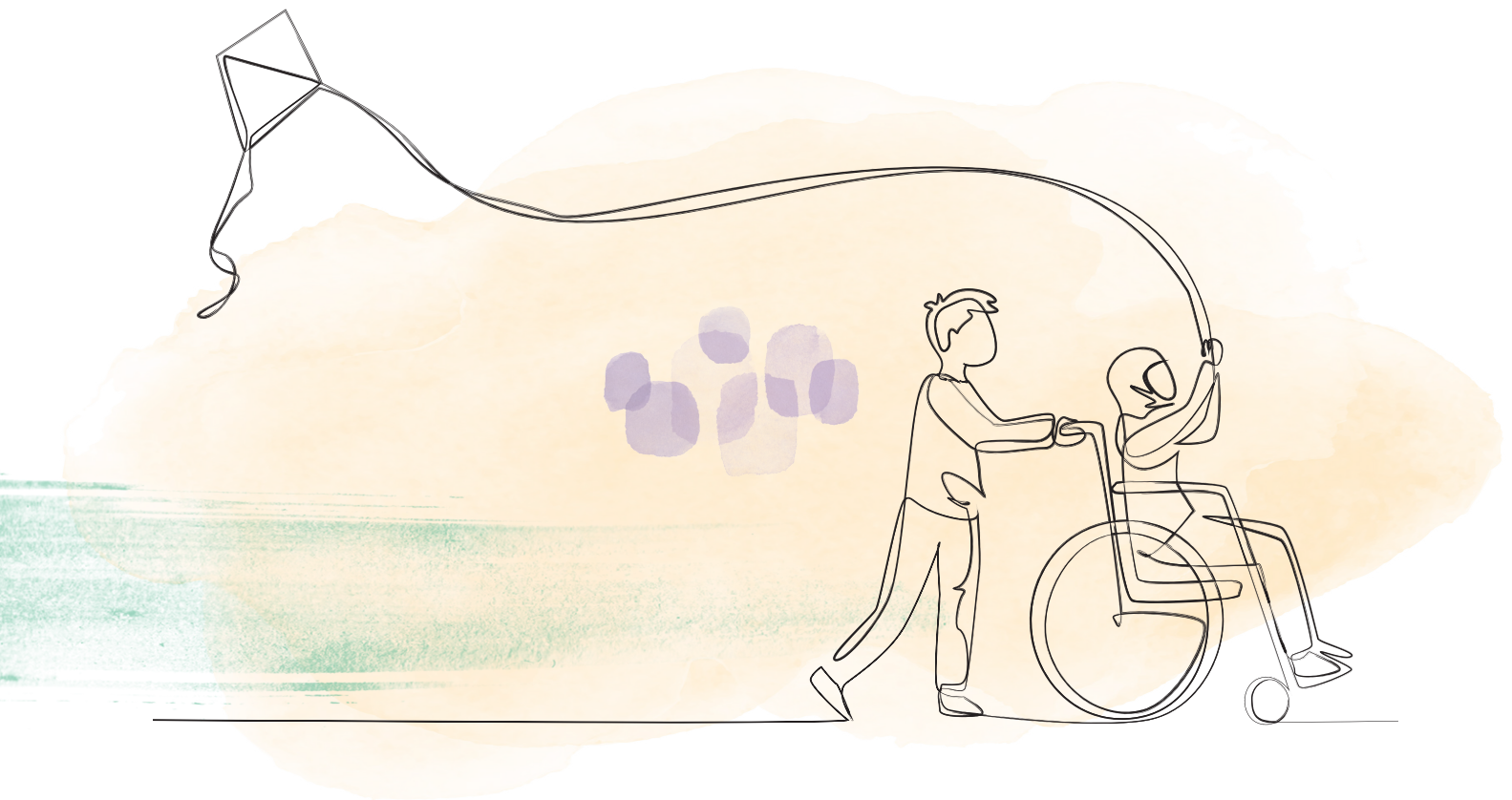
*Where we live, play, learn, work and grow matters.*

## Spring Into Health: The Power of Getting Outside

April is the first full month of spring, the time of year we dust off sports gear and head to practice, plant seeds for a summer vegetable garden, and pack snacks for hikes in nearby parks.

After our third winter navigating the COVID-19 pandemic, spending time outdoors felt especially important — not only for adults but for kids, too. Depression and a multitude of other behavioral health problems among children are *on the rise*. Remote learning caused some children to *fall behind academically*, and “only 1 in 4 U.S. adults and 1 in 5 high school students met the recommended physical activity guidelines,” according to the Centers for Disease Control and Prevention (CDC).

The good news is that simply getting outside and moving around can make a huge difference.



Studies suggest that spending time in nature is likely to have beneficial effects on brain development, symptom management for children with ADHD, and parent-child communication. The many benefits of physical activity include reducing the risk of depression and cardiovascular disease, as well as supporting cognitive functions like learning and decision-making. As a nation, we stand to save \$117 billion annually. This is the amount the CDC estimates we currently lose “due to inadequate levels of physical activity.”

With so much evidence about the power of physical activity and outdoor time, what prevents more children and their families from reaping these benefits?

Our reliance on and frequent, if not almost continuous, use of computers and smartphones isn't helping. You've likely heard that “sitting is the new smoking.” Maybe you've purchased a standing desk or started taking more walking meetings to get more activity into your day. The same general concern about lack of physical activity applies to children. On April 5, an international panel convened by the Sedentary Behavior Research Network (SBRN) released specific recommendations for “school-related sedentary behaviors” among children. The recommendations include guidelines relating to movement breaks, incorporating movement into homework, and replacing screen-based learning activities with outdoor, nonscreen-based lessons when possible.

Screens aren't the only things keeping us from getting outside more often. As the CDC notes, “Many Americans live in communities that are not designed for physical activity.” For example, there may not be adequate sidewalks, bike paths or safe crosswalks. Or, since trees clean and cool the air, neighborhoods without adequate tree coverage can have measurably poorer air quality and warmer summer temperatures than their leafier counterparts.

If we think about this in terms of potential savings, one study found that “urban trees in 55 cities across the U.S. help avoid \$4 billion in health care costs each year because they clean the air around them, keeping people's lungs healthier. The Trust for Public Land estimated that the health benefits of natural spaces in just 10 U.S. cities combined could be valued as high as \$69 million each year.”

Industrialist Alfred I. duPont, whose vision established Nemours, believed that “Old Dame Nature” was a superior physician. I imagine that duPont, who lived through the Spanish Flu pandemic of 1918-1920, would sympathize with the challenges we face after our third winter navigating the pandemic.



He would marvel at the rapid development of vaccines to protect us against COVID-19. And he would be perplexed by our near-constant preoccupation with staring at screens instead of the green and blooming world beyond our doors. I think that Mr. duPont would also be very encouraged by the *East Coast Greenway*, a 3,000-mile project that aims to connect a network of trails from Maine to Florida. The Greenway is not far from either of the two estates duPont built and called home: Nemours Estate in Wilmington, Del., and Epping Forest in Jacksonville, Fla.

As the authors of a *2019 report on the Delaware River Watershed* portion of the Greenway explain, “these findings project the Greenway would generate a more than ten-fold return of over \$3 billion in public health, environmental, and economic benefits.”

Based on usage in 2018 in the Delaware River Watershed alone (which includes parts of Pennsylvania and South Jersey), the region benefited from an estimated \$46 million in preventive health care savings across just four existing trails for an average savings of \$142 per person. The report also suggests that the region received almost \$40 million in environmental benefits from existing trails in 2018 alone.

More communities, health systems, schools and businesses are recognizing that having access to outdoor space is part of creating and maintaining health — and in turn, reducing costs and improving health, education and economic outcomes. Now let’s get outside and, as Alfred might say, enjoy Old Dame Nature this spring.

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Here are three resources for finding free or low-cost ways to increase your family’s active outdoor time:

- *Find parks* near you and programs for children and families.
- State parks also offer a wide variety of outdoor recreational experiences. For example, in Florida, where I live, *state parks offer activities* like camping, fishing, kayaking and snorkeling.
- Our *KidsHealth.org* provides free, physician-reviewed information — including how-to videos — about exercise and other health topics for kids, teens, parents and educators.

## Beneficial Side Effects: Transportation and Health

I remember it like it was yesterday. I was teaching my beautiful youngest daughter to ride a bike. In addition to being adorable, she had a bit of a temper. After falling again and again, she became so frustrated with the bike that she bit the pedal in anger. Fortunately, this little tyrant grew into an exceedingly mature and empathetic college graduate with more emotional intelligence than I will ever have.

What this story still evokes in me is the very emotional nature of transportation. The ability to move around freely in a variety of situations is a deeply important need for humans. Transportation is clearly an important factor in our everyday lives, but we may fail to appreciate how critical it is to our health. When gas prices rise, for example, many Americans are forced to re-evaluate or even eliminate important errands, appointments and commutes. When transportation is consistently unavailable or inaccessible, meeting basic needs becomes challenging or impossible. Read on to learn how efforts to transform transportation could change our health for the better.

Since emerging roughly 10 years ago, ridesharing companies Uber and Lyft have created Uber Health and Lyft Healthcare to provide nonemergency rides to and from medical appointments. Healthcare systems can use these services to give providers the ability to schedule transportation for qualifying patients and pay for the ride, which is covered by some insurance companies. Nemours, for example, partners with Uber Health in the Delaware Valley to ensure that children don't miss critical appointments.

Why would systems like Nemours and payers like Medicaid incorporate rideshares into the provision of health care?

Because rideshares help ensure that patients are seen before their condition worsens, becoming more urgent and expensive to treat. In other words, tackling transportation challenges improves outcomes for patients — and improves the efficiency and efficacy of healthcare systems too.

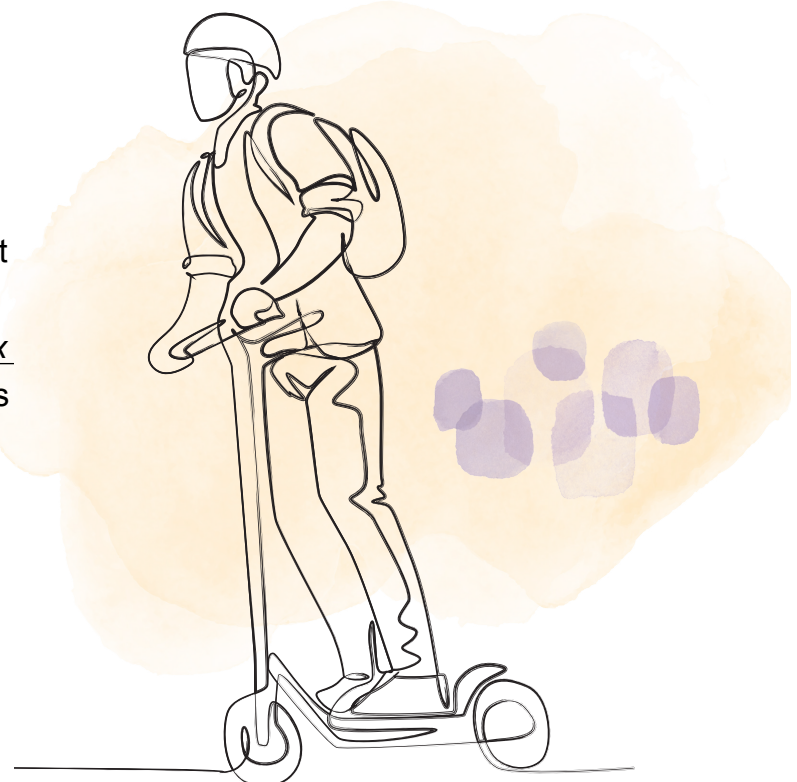
As I have said many times before, health is about so much more than medical care — other factors, like nutrition, are essential to health. But what if you can't get to the grocery store? Ridesharing may offer a solution here, too. For example, through the Lyftup Grocery Access Program in *Atlanta*, *Indianapolis* and *Baltimore*, residents who live in food deserts can secure \$2 rides to and from participating grocery stores. Even when gas prices are high, doing one less MRI for advanced disease or preventing one unnecessary procedure can pay for an awful lot of rides.

In addition to transportation that takes you to grocery stores and doctor’s appointments, more and more communities are encouraging a mode of transportation that promotes health through its very use: bicycles (please don’t bite the pedals). As Jill Lepore notes in a recent issue of *The New Yorker*, “More people get places by bicycle than by any other means, unless you count walking, which is also good for you, and for the planet, but you can travel four times faster on a bicycle than on foot, using only a fifth the exertion.”

To encourage more travel by bicycle, cities *from Boston to Missoula* are expanding bike lanes, and communities are building networks of bike paths, like the *East Coast Greenway*. Though interest in bicycle infrastructure projects seems to be rising, the concept has been around for a while. In the 1930s, as cars became increasingly common, author E.B. White *voiced his support* for bike paths. “A great many people have now reached 40 years of age in this country,” he noted, “... and they are the ones who specially enjoy bicycling, the men being somewhat elated on discovering that they can still ride with no hands.”

Today, almost a century after White described the joy of riding with no hands, more Americans are discovering that they can ride a bike with little to no pedaling at all. *An NBC News analysis* found that e-bike rides jumped from 11% or 240,000 trips in May 2020 to 38% or 1.4 million trips in May 2021, according to data collected from 11 cities with e-bike ridesharing programs.

Even so, many Americans lack access to an e-bike ridesharing program, and e-bikes can be expensive to own and maintain. To encourage more e-bike ownership, local and state governments and the federal government are considering and implementing purchase incentives (*like a proposed 30% refundable tax credit*). In the meantime, cities like Los Angeles and Buffalo are establishing “e-bike libraries.” In partnership with the nonprofit *Shared Mobility* and stocked with e-bikes donated by Uber JUMP, these libraries allow members to borrow bikes at no cost for months at a time.



Though more expensive than their nonelectric predecessors, e-bikes are still significantly cheaper to own and maintain than cars. As the authors of a recent paper on e-bike adoption explain, “The comparatively low ownership and operation cost of an e-bike is a potent argument for the potential for e-bikes to work as an equity-driving tool” as well as the potential to help cities reach ambitious transportation and environmental goals.

Transportation represents a significant barrier to care for many people, especially those in vulnerable groups like children. America could save billions of dollars by facilitating access to transportation options that allow individuals to visit the doctor, purchase nutritious food, and maybe even exercise in the process. But there’s another way that transportation matters to health. Vehicle emissions contribute to air pollution that negatively impacts our health. Nemours saw this first-hand when we discovered that idling school buses were related to a significant number of asthma-related visits to our ER.

Fortunately, a team led by Cornell University found greater adoption of electric vehicles, driverless cars, and ridesharing could prevent “5,500 premature deaths, with an annual savings of \$58 billion” by 2050. According to their models, the states likely to experience the “largest decreases in premature mortality” include California, Texas, New York, Ohio and Florida.

The interdisciplinary team behind these promising numbers used sophisticated models to generate their estimates, but we also have “real-world” evidence from the COVID-19 crisis. Ridesharing provided a critical transportation option to essential workers during the pandemic, explained The World Economic Forum. The organization also noted that research shows adoption of “emerging mobility technologies like shared, electric and autonomous mobility (SEAM) over the next three decades could increase accessibility, social equity, and economic growth while reducing transport emissions by more than 80%.”

Movies and TV shows have depicted futures where we ride around in flying cars and take rockets on interplanetary vacations. We’re not there yet, but we are making progress — like the driverless shuttle patients and families can use when visiting Nemours Children’s Hospital, Florida in Orlando.

As I wait for my flying car, I’ll take some inspiration from E.B. White and see if I can still ride my bike with no hands — while wearing a helmet, of course!

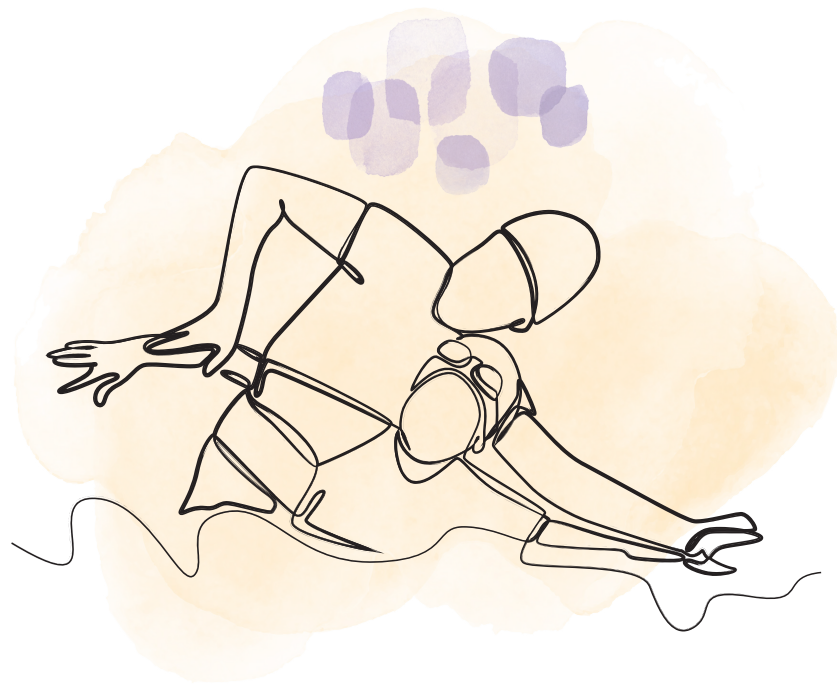


## Cool Kids: Building Resilience Against the Heat

High temperatures roll across many parts of America in the summer, just as teens start preseason sports practice and kids of all ages visit pools and beaches.

Outdoor activities like these are good for our health and well-being. In the heat of summer, we must pay extra attention to the risks these activities pose. High temperatures, especially heat waves, can lead to illness and accidents among children and young adults. Keeping them safe requires taking basic steps at home and outside as well as large-scale projects in our communities, country and around the world. Read on to learn how heat impacts children, what communities are doing to lower temperatures, and why combating heat is critical to America's next generation.

As any pediatrician will tell you, children are not miniature adults. Their bodies are still developing and are more vulnerable to heat illness. For example, children sweat at a lower rate and begin sweating at a higher temperature than adults. They also produce more heat relative to their body weight. A recent study analyzed more than 3 million ER visits to children's hospitals in 27 states from May to September. The authors found "that hotter days were associated with higher relative risks of ER visits for all causes."



As a trauma surgeon, I learned early in my training that visits to pediatric trauma centers increase markedly in summer months. We saw the largest increases in conditions directly related to temperature, but we also saw a rise in admissions from all causes. If one extrapolates these findings to the level of temperature increases predicted by some global warming models, the impact on child health could be profound.

The dangers of high temperatures aren't limited to outdoor environments. Heat waves mean changes in our routines and behaviors as we try to cool off. For example, more people open windows in the heat, which, as first responders interviewed by USA Today point out, increases the likelihood that children will fall out of them. Preventative actions include moving furniture away from windows and using window locks.



Summer also means more water play, swimming and boating. CDC researcher Merianne Spence *explains* that unintentional drowning deaths peak in the summer and are a leading cause of deaths caused by injury among children.

Whether cooling off at a neighborhood splash pad, jumping into a lake, or running into the ocean, water activities are a time-honored way to enjoy the outdoors and cool off. In the summer of 1939, as the A.I. duPont Institute was nearing completion, children with orthopedic conditions swam and received treatment at the duPont family's retreat in Cherry Island, Maryland. But today, the prevalence of heat-absorbing surfaces makes heat waves increasingly dangerous. When you add outdated infrastructure, like old schools and inefficient buildings, the reality is that many American children are learning, living and playing in spaces that are simply too hot.

Here are some examples of why this is happening:

- Neighborhoods are *losing trees* (or lacked *trees in the first place*).
- Many schools lack air conditioning or have *outdated air conditioning systems*, leading some to close for “heat days.”
- Energy costs are *straining the family budget*, and air conditioning is used sparingly, if it's available at all.

Cities and communities around the United States — and the world — are working to address these issues. One approach is to increase the number of trees and amount of vegetation, which can *significantly reduce temperatures* through shade and *evapotranspiration* while improving air quality, noise reduction and stormwater management. *Medellin, Colombia* has received international recognition for its successful use of trees to lower temperatures and outdoor spaces for residents.

Another approach is using “*cool roofing*” material or painting roofs light colors. *A team at Purdue University* has developed a paint that reflects 98.1% of sunlight, which could reduce the need for air conditioning and energy costs when applied to roofs. Researchers expect the paint to be publicly available within a few years.

Although heat waves aren't new to this century, we are experiencing more and more days of *extreme heat*. In fact, extreme heat causes *more weather-related deaths* in the United States in an average year than tornadoes, flooding or other weather-related hazards.

Phoenix, America's hottest city, has created an *Office of Heat Response and Mitigation* to reduce the number of heat-related deaths and illnesses. Of course, the United States is not alone in combating rising temperatures and heat-related deaths. Seville, Spain, has started naming heat waves, putting them on par with weather events like hurricanes (in case you're wondering, the first named *heat wave was Zoe*, which brought temperatures above 110°F to Seville).

As Eric Klinenberg explains *in his analysis* of the deadly 1995 Chicago heat wave, the weather was only part of the story. The key to understanding who succumbed and why was understanding the significance of the everyday conditions in which people lived and worked.

From the color of our roofs to the size of neighborhood parks, our surroundings can make us more vulnerable — or more resilient — to extreme events and natural disasters. Relying on air conditioning to keep our kids safe and in school is a short-term solution that contributes to the earth's heat problem. I believe, though, that the same American ingenuity and determination that led to the invention of *air-conditioning in the early 1900s* will lead to even larger-scale methods for keeping cool and staying healthy in the late summer months. Nothing is of a larger scale than outer space and that's exactly where scientists at *Stanford* are trying to send excess heat using radiative panels.

Reducing the rising number of historically hot days requires more than “out of this world” scientific innovation. Our resilience as a nation and as a species depends largely on our surroundings and everyday actions. To a greater degree than any other species on the planet, humans can construct and design the spaces around us — and adjust our behaviors to survive and thrive.

And it all starts with our children, homes and communities.

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Here are two resources to help you and the children in your life stay cool and safe during the summer:

- *Find out* what your community is doing to combat heat.
  - High temperatures can lead to heat cramps, heat stroke, and heat exhaustion among children and young adults. You can *learn more* about each and what to do if someone shows symptoms.
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# PART III: Empowerment Around Us

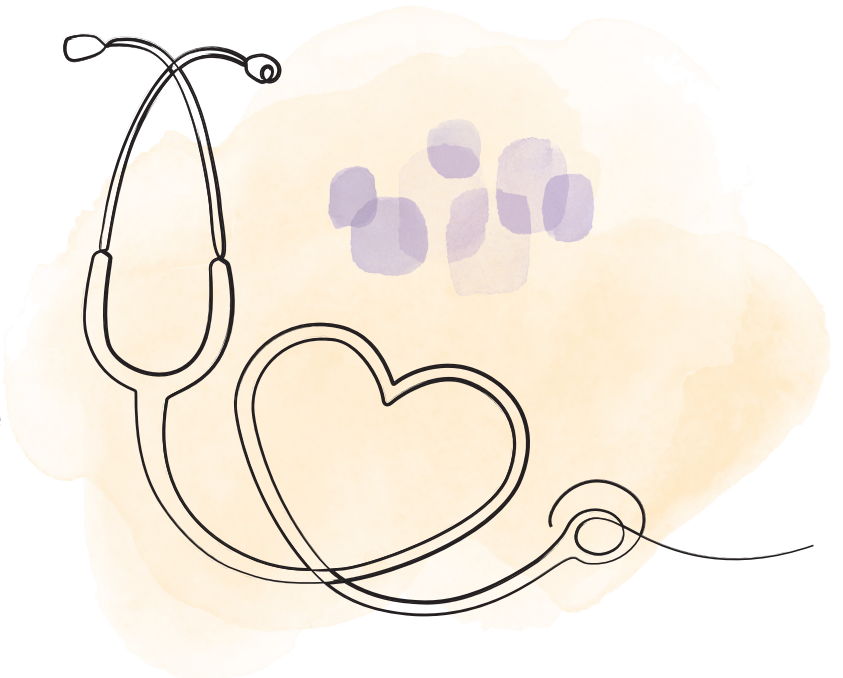
*With the right tools, we can all create more health.*

## The Importance of Heart Health for Women of All Ages

May is Women’s Health Month, and it’s also the month we celebrate mothers. I lost my mother to cancer in 2017 and there has not been a day since when I have not thought about her and felt her presence. There are so many things I love about my wife, but none is more important to me than being the best possible mother to our children.

Last Mother’s Day, my wife and I joined a group video chat with our children, who work and study in different parts of the country. After the call, I thought of two things. First, families have come to increasingly rely on video communications to stay connected, see a doctor, and attend school. Second, I thought about how we, as a society, could better care for the health of women so that all mothers could live longer, more productive, and more fulfilling lives. The pandemic has placed an especially heavy burden on moms, making this month the perfect time to shine a light on women’s health — at every stage of life.

Since the first day I began treating children as a pediatric surgeon, my appreciation for mothers has grown, extending beyond my own experiences as a son, husband and father. I am continuously awed by the dedication, selflessness and determination of the moms of the kids and teens we treat at Nemours. And as we work to raise the healthiest generations of Americans, I feel the opportunity to improve the health of the many children who will become mothers themselves.



Thanks to widespread prevention efforts and treatment, the average lifespan of women in the United States has increased from 78 to 81 years since the early 1980s. Still, we have significant room for improvement, especially compared to women's health in other parts of the world. As the Office on Women's Health notes, life expectancies of Asian and European women range from 81-90 years. When it comes to maternal health, America has the worst maternal mortality rate among the 10 wealthiest nations. The ratio of maternal deaths per 100,000 live births in France, which ranked ninth, is almost 50% less than the ratio in the United States. These impacted babies will grow up without a mother. This is an unacceptable tragedy in a nation that is the world's wealthiest and spends massively more on health care than peer nations.

While various factors contribute to America's shorter average lifespan among women and its high maternal death rate, heart disease is the primary and most common culprit of both. Among American women in general, the leading cause of death is heart or cardiovascular disease. Among American mothers, according to the Office on Women's Health, "the most common cause of pregnancy-related death is cardiovascular and coronary conditions."

So how do we improve women's health and reduce maternal deaths in the United States? We can and should make every effort to improve heart health among adult women and mothers. To improve the heart health of American women and mothers most effectively, we must also realize that these diseases begin in childhood and prevention efforts must focus there.

By taking steps to ensure that more people have a strong foundation for heart health when they enter adulthood, we could lower our mortality rate, improve life for millions of Americans, and save hundreds of billions of dollars a year.



Here are three areas of focus for building heart health in childhood:

- **Nutrition** — Evidence suggests that nutrition may be the *most critical factor* when it comes to preventing heart disease. In addition, *research suggests* that “healthy dietary habits established during childhood and adolescence could continue into adulthood.” Not surprisingly, one of the best places to introduce children to healthy foods is at school, where they spend a significant amount of their time. There is strong evidence that dietary habits established before age 10 persist for a lifetime. And as the *CDC notes*, healthy behaviors, including eating habits, “are connected to academic achievement.”
- **Physical Activity** — Exercise in childhood isn’t just about establishing good habits, boosting mood, and supporting cognitive functions like learning. Studies suggest that exercise in childhood may trigger changes that protect against heart disease in adulthood. The authors of *a study published in the journal, Nature*, explain that cardiovascular disease: “starts in childhood even though its symptoms are absent until much later in life ... A physically inactive (even normal-weight) child may have no symptoms of disease, but evidence of deterioration in vascular health may already be present.”
- **Chronic Stress** — Adults who experience high levels of chronic stress are at greater risk of heart disease. But there’s more to the story. High levels of stress in childhood can increase the risk of *heart disease in adulthood*. And young women, recent *studies suggest*, “are especially vulnerable to the negative effects of stress on the heart, which may result in earlier onset of heart disease or more negative health outcomes if the disease is already present.”

Through programs in schools and partnerships with parents, we can improve the heart health of tomorrow's adults — including women and mothers. I'm proud of the many ways in which Nemours works to promote nutrition, physical activity and mental health through initiatives like *Healthy Kids*, *Healthy Future* and *Raising Resilient Kids*, a video series created in collaboration with the Michael Phelps Foundation that features gold medalist Michael Phelps and his wife, Nicole, with Nemours experts. Of course, providing high-quality medical care is also a critical component of heart health in children and young adults. One recent example is Nemours patient *Grace Ryan*, whose rare heart condition was treated in her teens and who now attends college.

It's never too early to invest in the health of the next generation of Americans.



# The Supernatural Effects of Nutrition

I loved trick-or-treating as a kid, and I love it now as an adult. I was born to eat candy corn. My favorite chocolate bar is Mounds and I can't stand Almond Joy. I typically dressed up as my favorite baseball player, Luis Aparicio, Hall of Fame shortstop for the White Sox. Today, I love answering the door on October 31 and handing out lots of Mounds and M&M's® to kids of all ages.

Fall — a time of harvesting important crops and going door-to-door for candy — is a prime opportunity to think about how food can have supernatural effects on our health. The White House thinks so too, as it recently held a conference on nutrition, hunger and health to explore the impact of food on our nation and what we can do to make our future brighter for the next generation. Read on to learn more about how Halloween evolved, why we associate certain foods with the season, and the power of nutrition.

My daughter insists that the return of pumpkin spice latte drinks to coffee shop menus is the real indicator that summer is over. The dad (and stickler) in me can't help but point out that the autumnal equinox, which happens at the end of September in the Northern Hemisphere, is the official beginning of fall.

The humble, hearty pumpkin has a surprisingly rich history. One of the oldest crops cultivated in the Americas, pumpkin is a mainstay at modern Thanksgiving tables thanks in part to the development of Libby's® pie recipe. Starbucks™ sells around 20 million pumpkin spice lattes annually, and Hefty® introduced limited-edition cinnamon pumpkin spice scented trash bags this year.

Clearly, pumpkins are a big part of celebrating fall, and the nutritious fruit (Yes, pumpkins are fruits!) is also grown in many countries worldwide. The seeds and flesh are packed with fiber, vitamin A, zinc, magnesium and other nutrients that support bodily functions and boost the immune system. Scientists continue to study pumpkin's various benefits and potential uses, including its “anti-diabetic, antioxidant, anti-carcinogenic, anti-inflammatory” properties. So, what rivals pumpkins when celebrating fall in the United States?



Candy. Not because it's nutritious (As *The American Heart Association explains*, most Americans consume way more than is healthy.) but because we love trick-or-treating. Perhaps also because it's so dang good. According to the National Retail Federation, more Americans plan on trick or treating this year than carving a pumpkin, and spending on Halloween candy is likely to reach \$3.1 billion (the highest amount since the survey began).

In the United States, more than half of the sugar we consume comes from sugar beets harvested early fall through winter. Another key ingredient in candy is corn syrup — and most U.S. corn is harvested in the fall. But even as late as the first half of the 20th century, as Rutgers University Professor Samira Kawash *explains*: “Candy didn't have any special role to play in Halloween observance. For youth, and especially boys, Halloween was the one night of the year when communities generally tolerated pranking, which might range from the clever or playful to the dangerous or destructive ... While the hooligans were out wreaking havoc, the more genteel would celebrate Halloween with parties. The menus and décor for these early Halloween festivities emphasized seasonal fruits. Pumpkins and apples were especially important.” If fruits were once so popular on Halloween, when did candy become central to the holiday?

Halloween *likely originated from* the pagan celebration of Samhain in Ireland and the Christian celebration of All Hallows Eve. In the 18th and 19th centuries, immigrants brought these traditions to the United States, where they continued to evolve. By the early 20th century, as *Time magazine explains*: “High schools, rotary clubs and charities began to throw Halloween parties, and guidebooks about how to host such celebrations came out. By the 1930s, North America had a new term for the old tradition: trick-or-treating. And as suburbanization grew in the 1950s, trick-or-treating grew into the kid-friendly practice it's largely seen as today.” American companies had a hand in promoting the role of candy, too and passing out candy was *more convenient and considered safer* than homemade treats.

With World War II behind it, the end of sugar rationing, and significant advances in farming practices, the United States seemed like a prosperous and well-fed nation. But as Eileen Kennedy and Johanna Dwyer of Tufts University *explain*, this perception “changed in the mid-1960s when the discovery of hunger and malnutrition stunned many Americans.”

Many of the immigrants who brought the precursors to today's sugar-fueled Halloween festivities to the United States were fleeing the Great Potato Famine of the 1840s. Unfortunately, famines and food shortages are not relegated to history as the World Food Programme's HungerMap indicates. Even in the United States, one of the world's most wealthy and powerful nations, food insecurity threatens the health and well-being of millions of people, including children.

In 1969, the Nixon Administration held the first White House Conference on Food, Nutrition and Health. "The landmark conference," note Kennedy and Dwyer, "led eventually to the nationwide expansion of food stamps and the National School Lunch Program (NSLP); creation of the Special Supplemental Nutrition Program for Women, Infants and Children (WIC); permanent authorization of the National School Breakfast Program; and sowed the seeds for food-based dietary guidelines and nutrition labeling."

On September 29 of this year, more than 50 years after the first conference, the Biden Administration held another conference on hunger, nutrition and health. Daniella Gratale and Dr. Kara Odom-Walker of the Nemours Children's National Office of Policy and Prevention were invited to attend. As Dr. Walker explains: "The good news is this country has more than enough food to feed every single person. The not-so-good news? One in six go hungry, and too many children go to bed hungry." Conference speakers and attendees discussed ongoing and new efforts to end food insecurity and integrate food and health, including expanding Supplemental Nutrition Assistance Program (SNAP) eligibility and Medicare coverage of medically tailored meals. A timely study published in the Journal of the American Medical Association (JAMA) weeks after the White House Conference suggests that medically tailored meals "could potentially be associated with 1.6 million averted hospitalizations and net cost savings of \$13.6 billion annually from an insurer perspective."





In addition to engaging insurance companies and health care providers, *The White House* *acknowledges* that ensuring all Americans have access to nutritious food will require “collective, sustained action and mobilization across every segment of society.” One excellent example of collective action involves recovering the food that farmers already grow, but don’t harvest. For example, the nonprofit *National Gleaning Project* connects farmers with volunteers who harvest the left-behind produce for distribution and donation. As the *National Gleaning Project* explains: “It is currently estimated that more than 10 billion pounds of food are left in the field and never harvested, usually referred to as a ‘walk-by’ field by farmers. These walk-by fields have the potential to greatly support the current food system and significantly reduce food insecurity if harvested and utilized.” For-profit companies, like *Imperfect Foods* and *Misfits Market*, are also working to eliminate food waste and make nutritious food more affordable and accessible by delivering oddly shaped or blemished produce.

Given that we harvest so many crops in the fall, it’s no wonder that the United States has a tradition of holding state fairs, with blue ribbon contests and every indulgent food imaginable, beginning in late September and into October.

While I enjoy my share of funnel cakes and Halloween candy, I can’t overstate the importance of eating nutritious food. This is especially true for younger Americans, who are still growing and building lifestyle habits that will likely carry into adulthood. The ability of children “to meet their full potential depends on access to healthy and nutritious food,” says the *Children’s Hospital Association* and I couldn’t agree more. Nemours has made a significant commitment to help children and families access healthy food and learn about nutrition. One program I’m particularly proud of, the *National Early Child Care Collaboratives* (NECCC), works with early childhood educators to ensure that kids get nutritious foods and physical activity while away from home. So far, this program has reached more than 200,000 children. Perhaps most important, this program fosters healthy eating habits in early childhood that can build the foundation for lifelong health.

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Here are three more resources related to nutrition, food and health for you to explore during this harvest season and as Halloween approaches:

- Volunteer to harvest the “left-behind” fruits and vegetables in your area (some organizations allow children to volunteer, too).
  - Visit your local farmer’s market (find the closest market). You can also find out which farmer’s markets accept SNAP and EBT, and whether your insurance covers FarmboxRx, which ships healthy groceries to your doorstep.
  - Get tips for having a safe Halloween at [KidsHealth.org](https://www.kidshealth.org), where parents, kids and teens can also find information about nutrition and healthy eating.
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## Solving Big Challenges by Getting More Shut-Eye

I've done the math. I have gone all night without sleep for over 1,400 nights. I have had interrupted sleep for over 2,500 nights. I'm not proud of this. Such is life as a surgical resident and practicing pediatric surgeon.

Thankfully, we have learned more about sleep and the generations that followed me have a better relationship with slumber. Sleep is a treasured activity. We are only beginning to better understand its supreme relationship to health.

Of all the inputs to health, sleep is arguably the most fundamental. *Evidence suggests* that promoting better sleep could help address some of America's biggest challenges, from health equity to workforce productivity. The entire nation remembers how important sleep is when we change our clocks in the fall and spring. Ending the practice is even something most Americans agree on, according to *a 2019 poll*.

I expect you to vividly remember the challenges of lack of sleep during certain times in your life. For many of us, recalling the first months with a new baby evokes those memories. Even "all-nighters" in college can feel like yesterday despite the reality that those foggy nights occurred decades ago.

Sleep has fascinated philosophers, authors, artists and scientists for centuries. Aristotle attempted to make sense of its *purpose and function in 350 B.C.E.* From *A Midsummer Night's Dream* to *Macbeth*, William Shakespeare's plays are *full of references to sleep*. One of Vincent van Gogh's most famous paintings, *The Siesta*, depicts a man and a woman sleeping in a field on a sunny day. And almost 70 years ago, *Eugene Aserinsky* used an electroencephalogram (EEG) recording to demonstrate that, during Rapid Eye Movement (REM) sleep, "the brain cycles through various neurodynamic phases." Aserinsky's discovery has had a lasting impact on the diagnosis and treatment of sleep disorders, the study of the brain, and even our understanding of "the self."

The amount of sleep we need changes as we age. As the Centers for Disease Control and Prevention (CDC) outlines *here*, an infant needs a minimum of 12 hours of sleep (including naps) in a 24-hour period, while an adult needs at least seven hours a night. In addition to sleep duration, the quality of sleep matters. Feeling tired despite getting enough sleep could result from not getting enough deep sleep or REM sleep, despite getting enough overall sleep time. Millions of Americans suffer from a well-defined sleep disorder like *insomnia* or *sleep apnea*.

In a nutshell, sleep allows the human body to devote energy to repair and growth — in contrast to waking hours, when the bulk of our energy is spent thinking, moving, eating and so on. When we sleep, our bodies remove unnecessary neural connections, strengthen new neural connections, and release hormones that control hunger, healing and growth. Given even this simplistic description of the many complex activities that happen during sleep, it makes sense that the duration and quality of our sleep directly impact our individual — and collective — physical, mental and economic health.

Did you know that getting less than enough sleep increases the chances of developing a cold after exposure to the rhinovirus? Or that getting adequate sleep before getting a flu shot can impact the quality of the protective immune response our bodies generate?

As fall turns to winter, we face a “triple-demic” — COVID-19, the flu, and respiratory syncytial virus (RSV). Many young children didn’t build immunity through exposure to viruses during the height of the pandemic. Now, many hospitals are overwhelmed by pediatric patients requiring respiratory care. Paying extra attention to sleep during the fall and winter is key to boosting everyone’s immune systems and fighting viruses.

The impact of sleep on health extends to some of America’s deadliest diseases, too. The lack of sufficient, quality sleep is linked to heart disease, the number one killer in the United States. Reports on shift workers suggest that sleep duration and poor-quality sleep may be linked to cancer, the second leading cause of death in the United States.

Our physical safety is also at risk when we or those around us are not well-rested. On our roads, “drowsy driving” is responsible for thousands of driving fatalities annually. Industrial and engineering accidents like major oil spills have cited under-rested workers as a factor or direct cause.

What is the best way to increase the chances that you’ll be in a good mood and tackle the challenges of daily life? I expect that your personal experience corroborates strong scientific evidence that demonstrates that getting enough quality sleep is critical to everyday functioning. Yet, according to a 2015 CDC study, more than half of all middle and high school students didn’t get enough sleep on school nights. According to the U.S. Department of Health and Human Services, approximately 30 percent of adults get insufficient sleep.

Sleep disturbances or disorders are also associated with common mental health challenges, including *anxiety* and *depression*. For children, whose brains are still developing, sleep is particularly crucial. A *recent analysis* of 4,000 children in the National Institute of Health's ongoing Adolescent Brain Cognitive Development (ABCD) study indicates that insufficient sleep is linked to "impulsivity, stress, depression, anxiety, aggressive behavior, and thinking problems" as well as "impaired cognitive functions such as decision making, conflict solving, working memory, and learning." The study also found that changes to the brain structure "responsible for attention, memory, and inhibition control" occur in children after two years without sufficient sleep.

Delaying school start times is *recommended by* the American Academy of Pediatrics (AAP), the American Medical Association, and the American Academy of Sleep Medicine. Early adopters of the change have reported *dramatic improvements* in grades, test scores and driving safety.

Given all we now know and continue to learn, it's clear that sleep is critical to having a healthy, productive workforce today and in the future. In her book, *Mindshift*, engineer and educator Barbara Oakley explains, "Focusing your attention on learning something, followed by sleep, is a magic combination that allows for new synaptic connections." And she explains that because a limited number of new connections can form each day, a consistent pattern of focus and sleep is required to fully grasp new information and ideas.

Given the percentage of children and adults who don't sleep well or enough, America is missing out on vast potential in the current and future workforce. According to the *Rand Corporation*, the U.S. economy could increase economic output by \$226.4 billion annually if those of us currently getting the least sleep started sleeping six to seven hours a night.

Fortunately, more organizations are taking action. For example,

- A *bill to make Daylight Savings Time permanent* passed the Senate early in 2022 and remains in the House of Representatives.
- In 2022, *California became the first state* to require high schools to start no earlier than 8:30 a.m. and middle schools no earlier than 8:00 a.m.
- Companies that offer *employee sleep disorder screenings* and *sleep incentive programs* have reported measurable benefits like reduced health care costs and increased productivity.

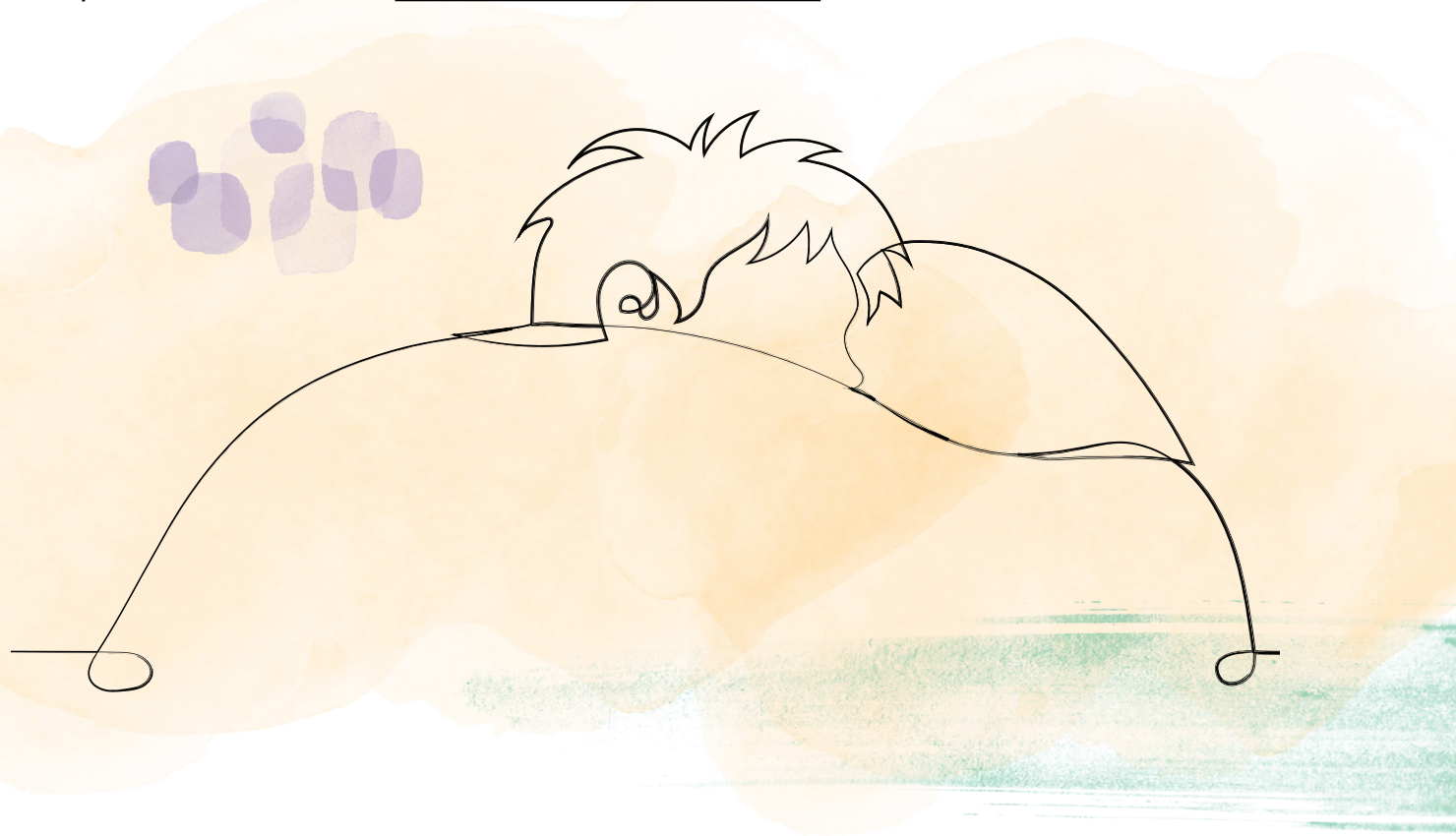


Efforts to promote sleep can also help close health equity gaps, which in turn improves health and economic outcomes. As outlined *in an analysis* published in the *Annual Review of Public Health*: “Widely observed differences in sleep health across the population may have implications for explaining widely observed gaps in health, by race, socioeconomic status, and other social dimensions. For example, a recent study found that 41% and 58% of racial differences in cardiometabolic risk (as measured by seven biomarkers) were accounted for by differences in sleep duration and sleep efficiency, respectively.”

The potential for sleep to help close health equity gaps extends to children, especially with regard to education. For example, students from low-income families perform as well as those from middle-income families *unless they don't get enough sleep*. As neuroscientist Matthew Walker points out in *Why We Sleep*, when children from lower socioeconomic backgrounds miss out on sleep due to early school start times, “The upshot is a vicious cycle that perpetuates from one generation to the next.”

As the movement to delay school start times demonstrates, Americans can collaborate across sectors like education, medicine and government to make evidence-based improvements in our health and well-being.

It's a powerful reminder that *Nemours' vision for child health* is a dream well within reach.



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If you're interested in learning more about sleep, here are some additional resources:

- Parents, children, teens and educators can find answers to a variety of questions about sleep at the world's most-visited website on children's health, [KidsHealth.org](https://kidshealth.org).
- Visit [sleepeducation.org](https://sleepeducation.org) for a bedtime calculator, information about sleep disorders, national initiatives, and other resources from the American Academy of Sleep Medicine.
- Watch or listen to Stanford Professor [Andrew Huberman's podcast](#) on the science of sleep and how to improve it.

# Conclusion

Thank you for taking the time to read this e-book.

Maybe these short pieces reinforced what you already knew or suspected, that being healthy or getting healthier involves more than medicine and medical care.

Maybe now you're wondering what would happen if America's healthcare system focused on addressing all the inputs to health instead of medical care and medicine alone?

In a nutshell, we would live longer lives and suffer less, and we would be more resilient to viruses and less susceptible to diseases and illness. As a society, our burden of chronic disease, such as cancer, diabetes and heart disease, would be a small fraction of what it is today. This would translate into greater workforce productivity and a stronger and more robust economy.

Studies and real-world experience show us that America can deliver more health to more people more efficiently. We can start by identifying populations that lack one or more critical inputs to health, whether it's better access to healthy food or transportation to medical appointments.

Then, we incentivize healthcare institutions to create health. This will empower providers to close the health gap by connecting communities and patients with the necessary resources.

Based on efforts to reform healthcare over the last few decades, I believe that focusing on changing healthcare for children rather than adults is the way to transform our country's health.

Starting with children addresses the population with the greatest capacity for improvement in health and the longest time horizon to realize the benefits. Investments in child health cost less and have both immediate and long-term benefits to individuals and the nation.

By starting with children's healthcare, we can show the rest of the country that addressing all the inputs to health is both possible and far superior to the results generated by the current medical-care-only approach. We also impact generations to come at no added cost. Incontrovertible evidence shows that healthy children grow up and raise their children to be healthier. Good habits stick!

# Next Steps: How You Can Improve Health in America

**1. For a health concern impacting you, a family member, or your community,** consider how medical and non-medical resources could or would help. Then, seek out expert advice and existing resources.

An increasing number of doctors and nurses connect patients with programs and services that support health yet lie beyond medicine and medical procedures. For example, a health care provider could:

- Refer a patient with a disease that could be helped through improved nutrition (most diseases) to a nutritionist and prescribe a meal delivery program
- Connect a patient with chronic asthma triggered by mold in their apartment to a housing rights attorney
- Provide a parent with information about free or low-cost recreational activities for children during the summer
- Connect with increasingly available school-based health centers to provide wrap-around support

You could also access resources that directly and indirectly support health through government and nonprofit organizations. For example, libraries offer internet access and research assistance, provide free services like tax preparation assistance and children's programming, and may have a dedicated library social worker.

**2. To improve health outcomes in your community and beyond,** encourage your local, state and federal government officials to invest in the non-medical, “everyday” things that create health (learn more about the power of investing in health, especially in childhood, [here](#)).

Our political leaders hold the purse strings to improving many of the challenges I have touched upon in this e-book. When more political leaders understand how health is created and that voters do too, they are more likely to take steps like:

- Increasing support for better housing
- Changing regulations to improve air quality
- Eliminating food deserts to ensure that all neighborhoods have access to healthy foods

This information can often be found on an office holder's or candidate's website. Look for their support of programs and initiatives that involve integrated solutions to issues affecting children's health, such as:

- Improving water quality, supporting public schools, or raising nutritional standards for school lunches
- Updating parks, creating bike paths, and otherwise supporting recreational activities in the community
- Increasing access to pediatric health screenings through partnerships with community organizations like churches and libraries

**3. Help create a society that values its children and invests in its future.** There are many ways to take action and demand that our society puts the needs of our children first.

For example:

- Volunteer in the classroom, participate in school fund-raisers and voice your support for closing funding gaps.
- Vote for political leaders who protect the interests of children.
- Donate your time to any of the many organizations that support the intellectual and physical development of your community's children.
- Mentor a child or young adult in your community who could benefit from your attention and support.





# About the Author



*R. Lawrence 'Larry' Moss, MD, FACS, FAAP*, pediatric surgeon and children's health system CEO, delivers a positive message about health and how we can do better for ourselves and our future. With accessible language and a conversational tone, he clarifies the long-term social and economic benefits of creating health from birth with everyday examples and straightforward explanations of existing evidence.

To learn more, visit Dr. Moss at [Nemours.org/LarryMossLeadership](https://nemours.org/LarryMossLeadership) and follow on Twitter [@LarryMossMD](https://twitter.com/LarryMossMD).