

“An elegant and exciting book that deserves to be read broadly and deeply.”

—Siddhartha Mukherjee, Pulitzer Prize-winning and #1 *New York Times* bestselling author

Lifespan

Why
We Age—
and
Why We
Don't
Have To

David A. Sinclair, PhD,

with Matthew D. LaPlante

Praise for LIFESPAN

“In this insightful and provocative book that asks questions about how we age, and whether humans can overcome decay and degeneration, Sinclair grapples with some of the most fundamental questions around the science of aging. The result is an elegant and exciting book that deserves to be read broadly and deeply.”

—Siddhartha Mukherjee, Pulitzer Prize–winning and #1 *New York Times* bestselling author

“If you ever wondered how we age, if we can slow or even reverse aging, and if we can live a healthy 100-plus years, then David Sinclair’s new book, *Lifespan* . . . will guide you through the science and the practical strategies to make your health span equal your lifespan, and make your lifespan long and vibrant.”

—Mark Hyman, MD Director, Cleveland Clinic Center for Functional Medicine and #1 *New York Times* bestselling author

“This is the most visionary book about aging I have ever read. Seize the day—and seize this book!”

—Dean Ornish, MD, founder & president, Preventive Medicine Research Institute, and *New York Times* bestselling author of *UnDo It!*

“In *Lifespan*, David Sinclair eloquently tells us the secret everyone wants to know: how to live longer and age slower. Sinclair convinces us that it is not only possible to live beyond one hundred years, it is inevitable that we will be able to one day do so. If you are someone who wants to know how to beat aging, *Lifespan* is a must-read.”

—William W. Li, MD, *New York Times* bestselling author of *Eat to Beat Disease*

“[I]nsightful, inspiring, and informative. [Sinclair] has translated a wealth of molecular detail into a program that we can all use to live longer and healthier. For anyone interested in understanding the aging process, living longer, and avoiding the diseases of aging, this is *the* book to read.”

—Dale Bredesen, MD, *New York Times* bestselling author of *The End of Alzheimer's*

“A visionary book from one of the most masterful longevity scientists of our time. *Lifespan* empowers us to change our health today while revealing a potential future when we live younger for longer.”

—Sara Gottfried, MD, *New York Times* bestselling author of *The Hormone Cure*

“Prepare to have your mind blown. You are holding in your hands the precious results of decades of work, as shared by Dr. David Sinclair, the rock star of aging and human longevity.”

—Dave Asprey, founder and CEO of Bulletproof and *New York Times* bestselling author of *The Bulletproof Diet*

“Imagine a world in which we can live long enough to meet not just our grandchildren, but our great-grandchildren. This is Sinclair’s vision for the future of humankind, a vision that looks to science, nature, history, and even politics to make the case that it is possible to live well into our hundreds. *Lifespan* is boldly leading the way.”

—Jason Fung, MD, author of *The Diabetes Code* and *The Obesity Code*

“In *Lifespan*, Dr. David Sinclair . . . provides us with the everyday tools that we can all use to stop what he now calls ‘the disease of aging.’ . . . You owe it to yourself and your loved ones to read and follow his advice, as I have for the last 15 years!”

—Steven R. Gundry, MD, *New York Times* bestselling author of *The Longevity Paradox* and medical director of the International Heart and Lung Institute

“*Lifespan* . . . transcends everything we know about aging and longevity—a combination of brilliant scientific work, a pioneering mind, and the dream for a longer, healthier and happier life. *Lifespan* provides a vision for our future and the road map on how to get there, merging scientific breakthroughs and simple lifestyle changes to not only help us feel younger, but actually become younger.”

—Naomi Whittel, *New York Times* bestselling author of *Glow15*

“David Sinclair masterfully presents a bold vision of the future in which humanity is able to slow or reverse the aging process and live younger, healthier lives for longer.”

—Victor J. Dzau, MD, president of the US National Academy of Medicine and CEO of Duke University Medical Center

“There are few books that have ever made me think about science in a fundamentally new way. David Sinclair’s book did that for me on aging. This is a book that anyone who ages must read.”

—Leroy Hood, PhD, professor at the California Institute of Technology, inventor, entrepreneur, member of all three US National Academies, and coauthor of *Code of Codes*

“In *Lifespan*, the full force of [Sinclair’s] optimism, humor, and soft-spoken eloquence as a storyteller-scientist come through. I’m hoping we have David Sinclair with us and doing his science and writing books for another 500 years, give or take a century.”

—David Ewing Duncan, award-winning journalist, bestselling author, and curator of *Arc Fusion*

“*Lifespan* gives us hope for an extraordinary life. As the brilliant Dr. David Sinclair explains, aging is a disease, and that disease is treatable. This eye-opening book takes you to front lines of incredible breakthroughs. Enjoy this must-read masterpiece!”

—Peter H. Diamandis, MD, *New York Times* bestselling author of *Abundance* and *Bold*

“[D]escribes real science that will question the foundation of everything we assume about our life and society.”

—Salman Khan, founder of Khan Academy

“David is a pioneer poised to change how we think about and understand aging.”

—Stephanie Lederman, CEO of the American Federation for Aging Research (AFAR), New York

“The most important message and priority of our time. For years to come, humanity will reflect on this book with awe and respect. Read it. . . . Your life depends on it.”

—Marc Hodosh, former owner & cocreator of TEDMED

“A tour de force. Sinclair’s book, and his life’s work, ranks with humanity’s greatest contributions to helping enhance the joy and happiness of life, ranking with the works of Jenner, Pasteur, Salk, Locke, Gandhi, and Edison. A masterpiece.”

—Martine Rothblatt, founder, Chairwoman of the Board, and CEO of United Therapeutics and creator of SiriusXM Satellite Radio

“Stepping on the moon changed humanity. In *Lifespan*, Sinclair takes the ultimate step for humanity that will transform our lives beyond anything we could ever have imagined. The author is bold, the science is profound, and our future is here.”

—Henry Markram, PhD, professor at EPFL, Switzerland, director of the Blue Brain Project, and founder of Frontiers open-access journals

“An intellectually fascinating book with tantalizing insights on the most important issue about yours and everyone’s future.”

—Andrew Scott, PhD, professor of economics at the London Business School and author of *The 100-Year Life*

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L I F E S P A N

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David A. Sinclair, PhD, AO,

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Illustrations by Catherine L. Delphia

ATRIA BOOKS

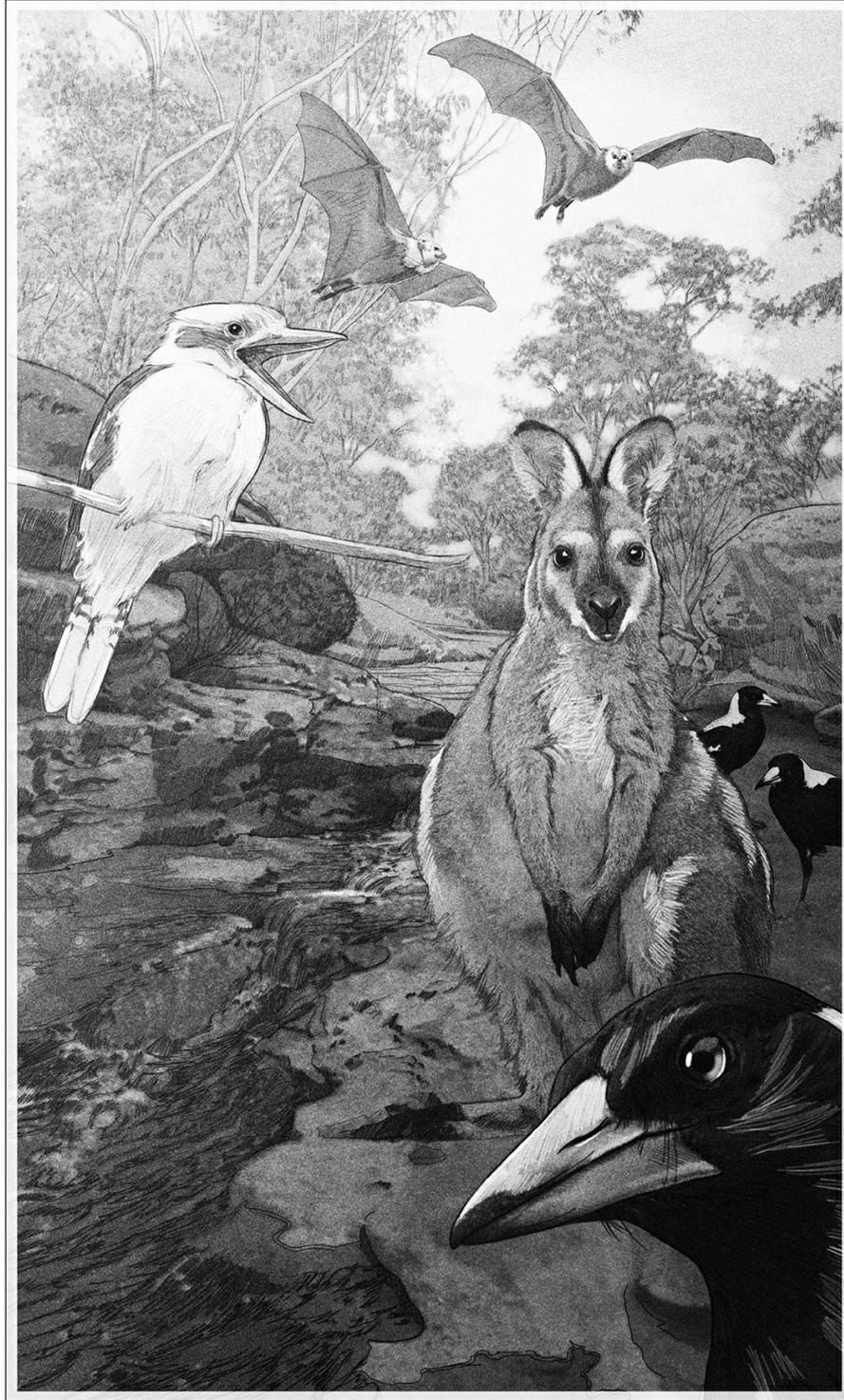
NEW YORK LONDON TORONTO SYDNEY NEW DELHI

*To my grandmother Vera, who taught me to see the world the way it
could be.*

To my mother, Diana, who cared more about her children than herself.

To my wife, Sandra, my bedrock.

*And to my great-great-grandchildren; I am looking forward to meeting
you.*



THE BUSH. In the wild and wonderful world of the Garigal clan, waterfalls and saltwater estuaries wind through ancient sandstone escarpments, under shadowy canopies of charred bloodwoods, angophoras, and scribbly gums that kookaburras, currawongs, and wallabies call home.

INTRODUCTION

A GRANDMOTHER'S PRAYER

I GREW UP ON THE edge of the bush. In figurative terms, my backyard was a hundred-acre wood. In literal terms, it was much bigger than that. It went on as far as my young eyes could see, and I never grew tired of exploring it. I would hike and hike, stopping to study the birds, the insects, the reptiles. I pulled things apart. I rubbed the dirt between my fingers. I listened to the sounds of the wild and tried to connect them to their sources.

And I played. I made swords from sticks and forts from rocks. I climbed trees and swung on branches and dangled my legs over steep precipices and jumped off of things that I probably shouldn't have jumped off. I imagined myself as an astronaut on a distant planet. I pretended to be a hunter on safari. I lifted my voice for the animals as though they were an audience at the opera house.

“Coooeey!” I would holler, which means “Come here” in the language of the Garigal people, the original inhabitants.

I wasn't unique in any of this, of course. There were lots of kids in the northern suburbs of Sydney who shared my love of adventure and exploration and imagination. We expect this of children. We *want* them to play this way.

Until, of course, they're “too old” for that sort of thing. Then we want them to go to school. Then we want them to go to work. To find a partner. To save up. To buy a house.

Because, you know, the clock is ticking.

My grandmother was the first person to tell me that it didn't have to be that way. Or, I guess, she didn't tell me so much as show me.

She had grown up in Hungary, where she spent Bohemian summers swimming in the cool waters of Lake Balaton and hiking in the mountains of its northern shore at a holiday resort that catered to actors, painters, and poets.

In the winter months, she helped run a hotel in the Buda Hills before the Nazis took it over and converted it to the central command of the Schutzstaffel, or “SS.”

A decade after the war, in the early days of the Soviet occupation, the Communists began to shut down the borders. When her mother tried to cross illegally into Austria, she was caught, arrested, and sentenced to two years in jail and died shortly after. During the Hungarian Uprising in 1956, my grandmother wrote and distributed anti-Communist newsletters in the streets of Budapest. After the revolution was crushed, the Soviets began arresting tens of thousands of dissidents, and she fled to Australia with her son, my father, reasoning that it was the furthest they could get from Europe.

She never set foot in Europe again, but she brought every bit of Bohemia with her. She was, I have been told, one of the first women to sport a bikini in Australia and got chased off Bondi Beach because of it. She spent years living in New Guinea—which even today is one of the most intensely rugged places on our planet—all by herself.

Though her bloodline was Ashkenazi Jew and she had been raised a Lutheran, my grandmother was a very secular person. Our equivalent of the Lord’s Prayer was the English author Alan Alexander Milne’s poem “Now We Are Six,” which ends:

*But now I am six,
I’m as clever as clever.
So I think I’ll be six now
for ever and ever.*

She read that poem to my brother and me again and again. Six, she told us, was the very best age, and she did her damndest to live life with the spirit and awe of a child of that age.

Even when we were very young, my grandmother didn’t want us to call her “grandmother.” Nor did she like the Hungarian term, “nagymama,” or any of the other warm terms of endearment such as “bubbie,” “grandma,” and “nana.”

To us boys, and everyone else, she was simply Vera.

Vera taught me to drive, swerving and swaying across all of the lanes, “dancing” to whatever music was on the car’s radio. She told me to enjoy my

youth, to savor the feeling of being young. Adults, she said, always ruined things. Don't grow up, she said. Never grow up.

Well into her 60s and 70s, she was still what we call "young at heart," drinking wine with friends and family, eating good food, telling great stories, helping the poor, sick, and less fortunate, pretending to conduct symphonies, laughing late into the night. By just about anyone's standard, that's the mark of a "life well lived."

But yes, the clock was ticking.

By her mid-80s, Vera was a shell of her former self, and the final decade of her life was hard to watch. She was frail and sick. She still had enough wisdom left to insist that I marry my fiancée, Sandra, but by then music gave her no joy and she hardly got out of her chair; the vibrancy that had defined her was gone.

Toward the end, she gave up hope. "This is just the way it goes," she told me.

She died at the age of 92. And, in the way we've been taught to think about these things, she'd had a good, long life. But the more I have thought about it, the more I have come to believe that the person she *truly* was had been dead many years at that point.

Growing old may seem a distant event, but every one of us will experience the end of life. After we draw our last breath, our cells will scream for oxygen, toxins will accumulate, chemical energy will be exhausted, and cellular structures will disintegrate. A few minutes later, all of the education, wisdom, and memories that we cherished, and all of our future potential, will be irreversibly erased.

I learned this firsthand when my mother, Diana, passed away. My father, my brother, and I were there. It was a quick death, thankfully, caused by a buildup of liquid in her remaining lung. We had just been laughing together about the eulogy I'd written on the trip from the United States to Australia, and then suddenly she was writhing on the bed, sucking for air that couldn't satisfy her body's demand for oxygen, staring at us with desperation in her eyes.

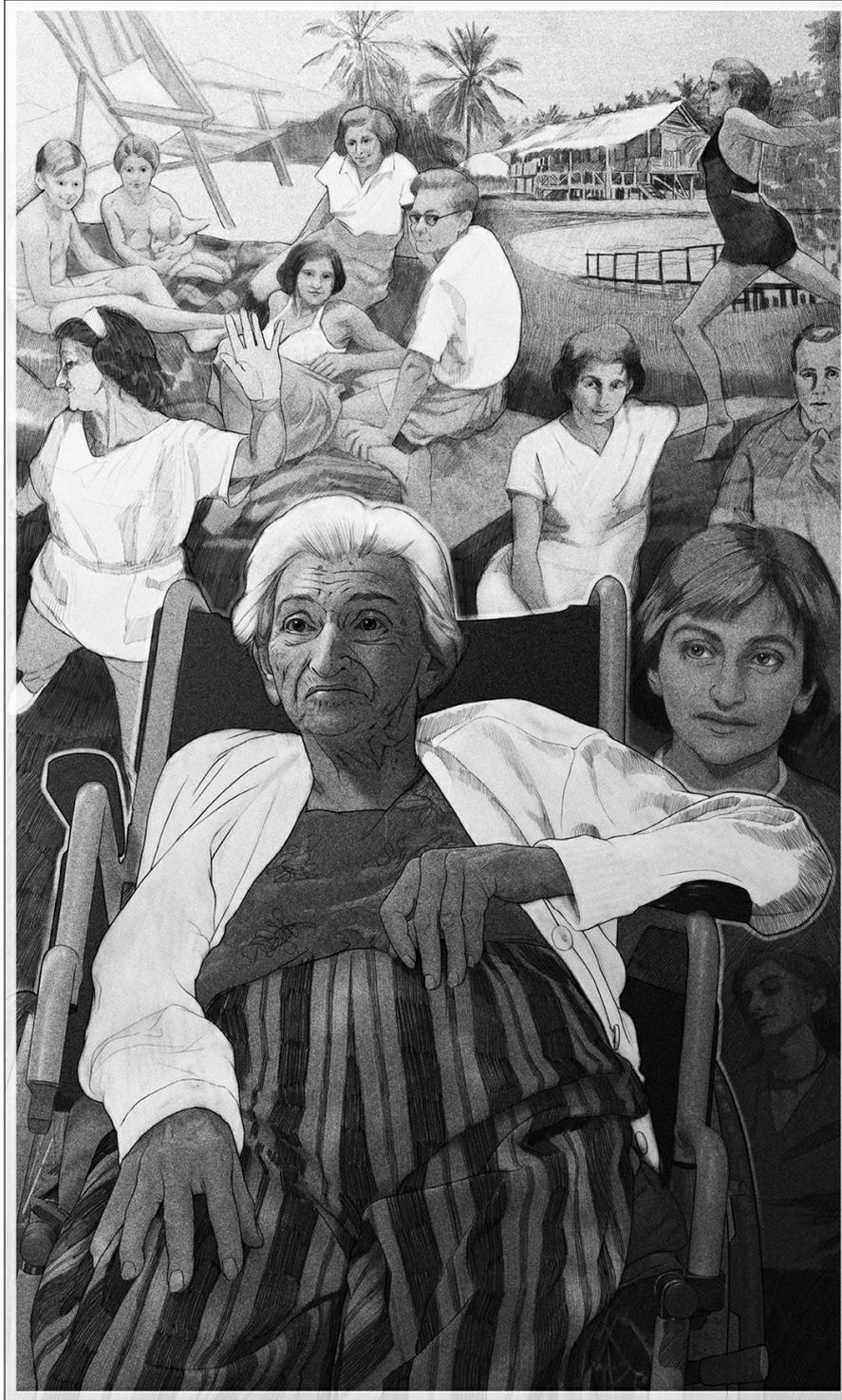
I leaned in and whispered into her ear that she was the best mom I could have wished for. Within a few minutes, her neurons were dying, erasing not just the memory of my final words to her but all of her memories. I know some people die peacefully. But that's not what happened to my mother. In those moments she was transformed from the person who had raised me into a

twitching, choking mass of cells, all fighting over the last residues of energy being created at the atomic level of her being.

All I could think was “No one tells you what it is like to die. Why doesn’t anyone tell you?”

There are few people who have studied death as intimately as the Holocaust documentary filmmaker Claude Lanzmann. And his assessment—indeed, his warning—is chilling. “Every death is violent,” he said in 2010. “There is no natural death, unlike the picture we like to paint of the father who dies quietly in his sleep, surrounded by his loved ones. I don’t believe in that.”¹

Even if they don’t recognize its violence, children come to understand the tragedy of death surprisingly early in their lives. By the age of four or five, they know that death occurs and is irreversible.² It is a shocking thought for them, a nightmare that is real.



A "GOOD, LONG LIFE." My grandmother "Vera" sheltered Jews in World War II, lived in primitive New Guinea, and was removed from Bondi Beach for wearing a bikini. The end of her life was hard to watch. "This is just the way it goes," she said. But the person she truly was had been dead many years at that point.

At first, because it's calming, most children prefer to think that there are certain groups of people who are protected from death: parents, teachers, and

themselves. Between 5 and 7, however, all children come to understand the universality of death. Every family member will die. Every pet. Every plant. Everything they love. Themselves, too. I can remember first learning this. I can also very well remember our oldest child, Alex, learning it.

“Dad, you won’t *always* be around?”

“Sadly, no,” I said.

Alex cried on and off for a few days, then stopped, and never asked me about it again. And I’ve never again mentioned it, either.

It doesn’t take long for the tragic thought to be buried deep in the recesses of our subconscious. When asked if they worry about death, children tend to say that they don’t think about it. If asked what they do think about it, they say it is not a concern because it will occur only in the remote future, when they get old.

That’s a view most of us maintain until well into our fifties. Death is simply too sad and paralyzing to dwell on each day. Often, we realize it too late. When it comes knocking, and we are not prepared, it can be devastating.

For Robin Marantz Henig, a columnist at the *New York Times*, the “bitter truth” about mortality came late in life, after she became a grandparent. “Beneath all the wonderful moments you may be lucky enough to share in and enjoy,” she wrote, “your grandchild’s life will be a long string of birthdays you will not live to see.”³

It takes courage to consciously think about your loved ones’ mortality before it actually happens. It takes even more courage to deeply ponder your own.

It was the comedian and actor Robin Williams who first demanded this courage from me through his portrayal of John Keating, the teacher and hero in the film *Dead Poets Society*, who challenges his teenage students to stare into the faces of the long-dead boys in a fading photo.⁴

“They are not that different from you, are they?” Keating says. “Invincible, just like you feel. . . . Their eyes are full of hope . . . But you see, gentlemen, these boys are now fertilizing daffodils.”

Keating encourages the boys to lean in closer to listen for a message from the grave. Standing behind them, in a quiet, ghostly voice, he whispers, “*Carpe. Carpe diem*. Seize the day, boys. Make your lives extraordinary.”

That scene had an enormous impact on me. It is likely that I would not have had the motivation to become a Harvard professor if it hadn't been for that movie. At the age of 20, I had finally heard someone else say what my grandmother had taught me at an early age: Do your part to make humanity be the best it can be. Don't waste a moment. Embrace your youth; hold on to it for as long as you can. Fight for it. Fight for it. Never stop fighting for it.

But instead of fighting for youth, we fight for life. Or, more specifically, we fight against death.

As a species, we are living much longer than ever. But not much better. Not at all. Over the past century we have gained additional years, but not additional life—not life worth living anyway.⁵

And so most of us, when we think about living to 100, still think “God forbid,” because we've seen what those final decades look like, and for most people, most of the time, they don't look appealing at all. Ventilators and drug cocktails. Broken hips and diapers. Chemotherapy and radiation. Surgery after surgery after surgery. And hospital bills; my God, the hospital bills.

We're dying slowly and painfully. People in rich countries often spend a decade or more suffering through illness after illness at the ends of their lives. We think this is normal. As lifespans continue to increase in poorer nations, this will become the fate of billions of additional people. Our successes in extending life, the surgeon and doctor Atul Gawande has noted, have had the effect of “making mortality a medical experience.”⁶

But what if it didn't have to be that way? What if we could be younger longer? Not years longer but decades longer. What if those final years didn't look so terribly different from the years that came before them? And what if, by saving ourselves, we could also save the world?

Maybe we can never be six again—but how about twenty-six or thirty-six?

What if we could play as children do, deeper into our lives, without worrying about moving on to the things adults *have to do* so soon? What if all of the things we need to compress into our teenage years didn't need to be so compressed after all? What if we weren't so stressed in our 20s? What if we weren't feeling middle-aged in our 30s and 40s? What if, in our 50s, we wanted to reinvent ourselves and couldn't think of a single reason why we shouldn't? What if, in our 60s, we weren't fretting about leaving a legacy but *beginning* one?