Brian Johnson's PhilosophersNotes
More Wisdom in Less Time

THE BIG IDEAS

Telomeres
Dynamic aging at a cellular level.

Your Cells
Are listening to your thoughts.

Mind Your Telomeres
Negative vs. Resilient thinking.

Eat Move Sleep
Your way to happy telomeres.

Your Cellular Legacy
What will yours be?

The Telomere Effect

A Revolutionary Approach to Living Younger, Healthier, Longer

BY ELIZABETH BLACKBURN, PH.D. AND ELISSA EPEL, PH.D.
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"By cultivating your telomeres, you can optimize your chances of living a life that is not just longer but better. That is, in fact, why we've written this book. In the course of our work on telomeres we've seen ... too many men and women whose telomeres are wearing down too fast, who enter the diseasespan when they should still feel vibrant. There is abundant high-quality research, published in prestigious scientific journals and backed by the best labs and universities, that can guide you toward avoiding this fate. We could wait for those studies to trickle down through the media and make their way into magazines and onto health websites, but that process can take many years and is piecemeal, and, sadly, information often gets distorted along the way. We want to share what we know now—and we don't want more people or their families to suffer the consequences of unnecessary premature cellular aging.

When we lose people to poor health, we lose a precious resource. Poor health often saps your mental and physical ability to live as you wish. When people in their thirties, forties, fifties, sixties, and beyond are healthier, they will enjoy themselves more and will share their gifts. They can more easily use their time in meaningful ways—to nurture and educate the next generation, to support other people, solve social problems, develop as artists, make scientific or technological discoveries, travel and share their experiences, grow businesses, or serve as wise leaders.
As you read this book, you are going to learn a lot more about how to keep your cells healthy. We hope you're going to enjoy hearing how easy it is to extend your healthspan. And we hope you're going to enjoy asking yourself the question: *How am I going to use all those wonderful years of good health?* Follow a bit of the advice in this book, and chances are that you'll have plenty of time, energy, and vitality to come up with an answer."

~ Elizabeth Blackburn, Ph.D. and Elissa Epel, Ph.D. from *The Telomere Effect*

"Which is right? Nature or nurture? Genes or environment? Actually, both are critical, and it's the interaction between the two that matters most."

~ Elizabeth Blackburn, PhD and Elissa Epel, PhD

Elizabeth Blackburn won the Nobel Prize for her discovery of telemorase—*"the enzyme that replenishes telomeres, which protect our genetic heritage."*

Elissa Epel is one of the world's leading health psychology researcher.

Together, they have created a great book that walks us through the best of what we know about telomeres, why they're so important and what we can do to Optimize them.

If you've ever wanted to learn more about telomeres, THIS is the book to read. (Get a copy here.)

It's PACKED with wisdom and provides an incredibly thorough, rigorous look at what we KNOW works. I'm excited to share some of my favorite Ideas so let's jump straight in!

(First, a quick pronunciation lesson: *Telomere* is pronounced "tee-lo-mere" not "tell-o-mere." While *telomerase* is pronounced "tell-OMM-er-ase.")

TELOMERES + DYNAMIC AGING AT A CELLULAR LEVEL

"It also meant that our life experiences, and the way we respond to those events, can change the lengths of our telomeres. In other words, we can change the way that we age, at the most elemental, cellular level."

~ Elizabeth Blackburn, PhD and Elissa Epel, PhD

"We're going to show you a completely different way of thinking about your health. We are going to take your health down to the cellular level, to show you what premature cellular aging looks like and what kind of havoc it wreaks on your body—and we'll also show you not only how to avoid it but also how to reverse it. We'll dive deep into the genetic heart of the cell, into the chromosomes. This is where you'll find **telomeres (tee-lo-meres)**, repeating segments of noncoding DNA that live at the ends of your chromosomes. Telomeres, which shorten with each cell division, help determine how fast your cells age and when they die, depending on how quickly they wear down. The extraordinary discovery from our research labs and other research labs around the world is that the ends of our chromosomes can actually lengthen—and as a result, aging is a dynamic process that can be accelerated or slowed, and in some aspects even reversed. Aging need not be, as thought for so long, a one-way slippery slope toward infirmity and decay. We all will get older, but how we age is very much dependent on our cellular health."

We are all, of course, going to get older and age. But... The process is dynamic and we have a *lot* more influence than we may have thought.

Liz and Elissa tell us that *"Aging can be defined as the cell's 'progressive functional impairment and reduced capacity to respond appropriately to environmental stimuli and injuries.'"*

Then they ask: *"Why do people age differently?"* They tell us that one reason is *cellular* aging. Then they ask: *"What causes cells to get old before their time?"*

The answer to that? They tell us to think of shoelaces: *"Do you know the protective plastic tips at the end of shoelaces? These are called aglets. The aglets are there to keep shoelaces from fraying. Now imagine that your shoelaces are your chromosomes, the structures inside your cells that carry your genetic information. Telomeres, which can be measured in units of DNA known as base pairs, are like the aglets; they form little caps at the end of the chromosomes and keep the genetic material from unraveling. They are the aglets of aging."*

So, if you want nice shoelaces, you need nice aglets, eh? Same thing with our chromosomes. We need nice, long telomeres at the ends.

Here's another way they put it: *"These are the base pairs of telomeres that, repeated thousands of times, offer a way of measuring their length. ... The repeating sequence highlights the differences between telomeres and other DNA. Genes, which are made of DNA, live within a chromosome. (Inside a cell we have twenty-three pairs of chromosomes, for a total of forty-six.) This genetic DNA is what forms your body's blueprint, its instruction manual. Its paired letters create complicated 'sentences' that send instructions for building the proteins that make up your body. Genetic DNA can help determine how quickly your heart beats, whether your eyes are brown or blue, and whether you're going to have the long legs and arms of a distance runner. The DNA of telomeres is different. First of all, it doesn't live inside any gene. It sits outside all the genes, at the very edges of the chromosome that contains genes. And unlike genetic DNA, it doesn't act like a blueprint or code. It's more like a physical buffer; it protects the chromosome during the process of cell division. Like beefy football players who surround a quarterback, absorbing the hardest blows from the onrush of opposing players, telomeres take one for the team. This protection is crucial."*

"As the obesity researcher George Bray has said, 'Genes load the gun, and the environment pulls the trigger.' His words apply not just to weight gain but to most aspects of life."

~ Elizabeth Blackburn, PhD and Elissa Epel, PhD

In short: Our telomeres are the protectors of our chromosomes.

Picture the aglets of your shoelaces. Then picture the beefy linemen protecting your quarterback. If your linemen are weak and scrawny, your quarterback is going to sacked.

If your telomeres are short, your chromosomes aren't going to be able to do what they need to do. Enter: Accelerated aging.

The practical point of the book is to make the connection between your lifestyle choices and the qualities of those aglets/linemen. Know that you can strengthen and lengthen your telomeres and, in the process, delay the onset of what they call your "diseasespan" (the phase of your life marred by poor health) while extending the length of your "healthspan" such that you're not just living longer, you're living WELL longer.

The book is packed with a bunch of science about what's going on at the cellular level. For now, remember your aglets and linemen and KNOW that you can Optimize your telomeres via some simple yet powerful lifestyle changes. Let's take a look at a few we can apply today!

YOUR CELLS ARE LISTENING TO YOUR THOUGHTS

"Feeling threatened is not the only way to respond to stress. It's also possible to feel a sense of challenge. People with a challenge response may feel anxious and nervous during a lab stressor test, but they also feel excited and energized. They have a 'bring it on!' mentality. ...

Athletes who have a challenge response win more often, and a study of Olympic athletes has shown that these highly successful folks have a history of seeing their life problems as challenges to be surmounted.

The challenge response creates the psychological and physiological conditions for you to engage fully, perform at your best, and win. The threat response is characterized by withdrawal and defeat, as you slump in your seat or freeze, your body preparing for wounding and shame as you anticipate a bad outcome. A predominant habitual threat response can, over time, work itself into your cells and grind down your telomeres. A predominant challenge response, though, may help shield your telomeres from some of the worst effects of chronic stress."

That's from Part II: "Your Cells Are Listening to Your Thoughts," Chapter 4: "Unraveling: How Stress Gets into Your Cells."

If you've ever doubted the mind-body connection, now's a good time to drop that skepticism. Liz and Elissa walk through the compelling data that unequivocally establishes the fact that what we think affects our bodies and the trillions of cells trying to keep us Optimized.

The very first thing they tell us we need to get good at?

Seeing our problems as CHALLENGES rather than *threats*.

We've talked about this in various contexts. Check out our Notes on *The Upside of Stress* for some great wisdom from Kelly McGonigal. Pop quiz: Do you remember the simple phrase Kelly tells us we should say to ourselves when we're feeling the stress rise? ... Answer: *"I'm excited!!!"*

Liz and Elissa reflect on the same research. Simply saying "I'm excited!" to yourself when you feel those nerves kick in is a GREAT way to use the stress response to help you rock it.

Pop Quiz #2: Are you using it yet? If not, get on that! Let's get REALLY good at seeing our problems as CHALLENGES (vs. threats). That's a REALLY simple yet powerful way to do it!

So... What do YOU do when you face a challenge?

Do you kinda sorta try to avoid it and maybe feel bad about the fact that you even have to deal with it—thinking that something must be wrong with you because you have all these problems fixed-mindset style? (Enter: Threat response. Imagine your telomeres shrinking.)

Or... Do you rub your hands together, see those problems as reverse indicators that you're up to big things and shout "Bring it on!" (Enter: Challenge response. See your telomeres expanding!)

Liz and Elissa also like the mantra: *"This is good stress helping me perform!"* or *"I'm excited!" or "My heart is racing and my stomach is doing cartwheels. Fantastic—those are the signs of a good, strong stress response."*

> " People don't generally show responses that are *all* threat or *all* challenge. Most experience some of both. In one study we found that it was the proportion of these responses that mattered most for telomere health. The volunteers who felt more threat than challenge had shorter telomeres. Those who saw the stressful task as more of a challenge than a threat had longer telomeres."
>
> ~ Elizabeth Blackburn, PhD and Elissa Epel, PhD

> " Experiencing stress and pain is unavoidable. It is part and parcel of being involved in life, of loving and caring for people, caring about issues, and taking risks. Use the challenge response to protect your cells while you engage fully with life."
>
> ~ Elizabeth Blackburn, PhD and Elissa Epel, PhD

"As Ralph Waldo Emerson said, 'Don't be too squeamish about your actions. All life is an experiment. The more experiments you make the better.'"

~ Elizabeth Blackburn, PhD and Elissa Epel, PhD

My go to these days: *"Bring it on, baby!" "I LOVE challenges!!" "Challenges make me stronger!" "LET'S. DO. THIS!!!"* (With the occasional "BOOM!" thrown in at the end for good measure. :)

P.S. As you practice Optimizing your response to problems, make the connection to your telomeres. If you're feeling it, imagine yourself as the quarterback of your life. Courageously shout your challenge-response mantras at your linemen and watch them expand in power—knowing your telomeres are doing the same for every cell in your body!

P.P.S. Yesterday I had a coaching session with Phil Stutz. As I've said an infinite number of times, his #1 Tool is basically learning how to shift from a threat to a challenge response. He tells us we need to "reverse our desire" if we want to grow. I thought he'd get a kick out of the fact these authors recommend we adopt a "Bring it on!!" attitude if we want to take care of our telomeres. So I read him the first paragraph of this Idea. We both laughed.

P.P.P.S. Liz and Elissa reference Jim Afremow in this section. He's the mental toughness coach for the San Francisco Giants and author of *The Champion's Mind*. They share a story of an Olympic athlete who told him: *"Before every race, my pulse races. My heart is about to jump out of my chest. You've got to help me stop it!"*

His response? After he laughed he said, *"Do you really want me to stop your heart?"* He says that the worst thing athletes can do is try to get rid of their stress. —> *"They need to think of stress as helping them get ready to perform. They need to say, 'Yes! I need this!' Instead of trying to make the butterflies in their stomach go away, athletes need to make those butterflies line up and fly in formation."*

MIND YOUR TELOMERES: NEGATIVE VS. RESILIENT THINKING

"We are largely unaware of the mental chatter in our minds and how it affects us. Certain thought patterns appear to be unhealthy for telomeres. These include thought suppression and rumination as well as the negative thinking that characterizes hostility and pessimism. We can't totally change our automatic responses—some of us are born ruminators or pessimists—but we can learn how to keep those automatic patterns from hurting us and even find humor in them. Here we invite you to become more aware of your habits of mind. Learning about your style of thinking can be surprising and empowering."

"You can start to renew your telomeres, and your cells, right now. One study has found that people who tend to focus their minds more on what they are currently doing have longer telomeres than people whose minds tend to wander more. Other studies find that taking a class that offers training in mindfulness or meditation is linked to improved telomere maintenance."

~ Elizabeth Blackburn, PhD and Elissa Epel, PhD

So, we learned about the importance of a challenge response to stressful situations. The next thing we want to get good at? "Minding our telomeres" by replacing negative thinking with resilient thinking. (But only if we want to lengthen our telomeres!) Here's the quick look.

First: Negative thinking. This includes everything from trying to suppress your thoughts or ruminating to letting your mind wander or allowing yourself to feel "cynical hostility."

Very short story: Trying to suppress your thoughts doesn't work. Scientists call this "ironic error." (Try not to think of a white polar bear and what pops up?) Nor does ruminating. We'd be much better off letting our thoughts roll in and then roll out—recognizing that our thoughts have a very short half-life when we let them pass, kinda like clouds rolling through the sky.

Another good way to trim your telomeres is to allow yourself to get angry. They call it "cynical hostility." And then we have "mind wandering." Get this: *"The iPhone mind-wandering study showed that when people are not thinking about what they're doing, they're just not as happy as when they're engaged. As [researchers] observed, 'A wandering mind is an unhappy mind.'"*

How to be more resilient? First tip: Unitask. In fact, they tell us that focusing on what you're doing RIGHT THIS MOMENT is one of the best ways to high five your telomeres.

Another tip: Bring awareness to your thoughts. Simply stepping back from the torrent of thoughts and seeing them helps soften their blow and reduce rumination. (btw: They're big fans of Acceptance and Commitment Therapy. Check out our Notes on Russ Harris's books for more.)

And, they describe the power of a mindfulness practice many times throughout the book. Meditation. Yoga. Qi gong. Pick your favorite but train your mindfulness. (Liz also shared a cool "micro-meditation" practice where she uses time she used to get bored and antsy to take a couple deep breaths and focus her mind.

" Negative thoughts are like microtoxins-relatively harmless when your exposure is low, but in high quantities they are poisonous to your mind."

~ Elizabeth Blackburn, PhD and Elissa Epel, PhD

Plus, they love Kristin Neff and *Self-Compassion*. (Check out those Notes for more.)

One more way to get your resilience on and watch your telomeres lengthen? Purpose. They say: *"Life purpose is what brings us eudaemonic happiness, the healthy feeling that we are involved in something bigger than ourselves. Eudaemonic happiness is not the transitory happiness we experience when eating or buying something we really want; it is enduring well-being. A strong sense of our values and purpose can serve as a bedrock foundation that helps us feel stability through life events, those earthquakes both minor and major. In hard times, we can bring them to mind over and over again."*

How will YOU mind YOUR telomeres today? :)

EAT MOVE SLEEP YOUR WAY TO HAPPY TELOMERES

"When we want to spot the parties responsible for metabolic disease, we point a finger at the highly processed, sugary foods and sweetened drinks. (We're looking at you, packaged cakes, candies, cookies, and sodas.) These are the foods and drinks most associated with compulsive eating. They light up the reward system in your brain. They are almost immediately absorbed into the blood, and they trick the brain into thinking we are starving and need more food. While we used to think all nutrients had similar effects on weight and metabolism—a 'calorie is a calorie'—this is wrong. Simply reducing sugars, even if you eat the same number of calories, can lead to metabolic improvements. Simple carbs wreak more havoc on metabolism and control over appetite than other types of foods."

After getting our minds right, we move to our bodies. The book is basically a scientific overview of why our fundamentals are SUPER important. Eating, moving and sleeping each get their own chapter—echoing what we talk about all the time. Here's a quick look at some highlights.

EAT: #1 tip: Reduce/eliminate the sugar. (Note: That's a Nobel laureate coming down on the side of the "metabolic theory" and the fact that a calorie is NOT a calorie.) Eat more whole foods. Eliminate the kryptonite: *"Adding healthy foods to your diet is great, but it may be even more important to avoid the kind of processed, sugary, junky foods that feed cellular enemies."*

MOVE: It doesn't take a ton (as little as 3, 45-minute moderate aerobic workouts can do it), but it's SUPER important to be fit. Good news for ultra/endurance athletes: Train/run/etc. as long as you want PROVIDED you don't feel burned out. Note: *"If you have a high-stress life, exercise is not just good for you. It's essential. It protects you from stress-shortened telomeres."*

" Personality traits like cynical hostility and pessimism may damage your telomeres, but there's one personality trait that appears to be good for them: conscientiousness. Conscientious people are organized, persistent, and task oriented; they work hard toward long-term goals-and their telomeres tend to be longer."

~ Elizabeth Blackburn, PhD and Elissa Epel, PhD

SLEEP: They share the same sleep hygiene tips we cover in Sleep 101. Unless you're in the 5% of the population that can get by on less, you and your telomeres need 7+ hours per night. *"Then again, if you feel terrible without eight or nine hours of sleep, don't try to scrape by with seven. Get those extra hours. And remember that rule of thumb, which offers highly customized sleep advice: If you feel sleepy during the day, you need more sleep at night."*

A FRIENDLY CHALLENGE: WHAT IS YOUR CELLULAR LEGACY

"Telomere science has grown into a clarion call. It tells us that social stressors, especially as they affect children, will result in exponentially higher costs down the line—costs that are personal, physical, social, and economic. You can respond to that call by, first, taking good care of yourself.

The call doesn't end there. Now that you know how to protect your telomeres, we want to issue you a friendly challenge. What will you do with your many decades of brimming good health? A

" As Helen Keller said, ' Character cannot be developed in ease and quiet. Only through experiences of trial and suffering can the soul be strengthened, vision cleared, ambition inspired and success achieved."

~ Elizabeth Blackburn, PhD and Elissa Epel, PhD

long healthspan makes a vital, energetic life more possible, and that vitality can ripple outward, allowing us to spend some of our time creating conditions for better health and wellbeing in other people. ...

What is your cellular legacy? Each of us has a time-limited opportunity to leave a legacy. Just as your body is a community of individual but mutually dependent cells, we are a world of interdependent people. We all have an impact on the world, whether we realize it or not. Large changes, such as implementing policies for societal stress reduction, are vital. Small changes are important, too. How we interact with other people shapes their feelings and sense of trust. *Every day each of us has a chance to positively influence the life of another person.*"

Those are some of the last words in the book in the final section called "Outside In: The Social World Shapes Your Telomeres" in which Liz and Elissa walk us through how our environment shapes us and how we, in turn, have an opportunity (and, I would say, a moral obligation) to help shape our world positively.

One of the alarming things they point out in this section is the fact that the hardships one tends to experience in poverty effects the length of the telomeres of the people who have experienced it. AND... Science shows that those individuals pass on their shorter telomeres to their children who, unless their environment changes, will then continue the cycle. :/

The first step to making a difference? Mind your own telomeres. Optimize your life. But that, of course, is only the first step. It's the vehicle but not the destination.

The real question: What cellular legacy will you leave? How will you give your greatest gifts in greatest service to the world? Give us what you got. We need you now more than ever before.

With love and high fives to you and your telomeres, I say, "Let's do this!"

Brian Johnson,
Heroic Philosopher CEO

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- The Upside of Stress
- Mindsight
- The Champion's Mind
- Self-Compassion
- Wherever You Go, There You Are

About the Author of This Note

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Brian Johnson is the Founder + CEO of Heroic. He's spent half of the last 25 years as a Founder/CEO and the other half as a Philosopher. Brian loves integrating ancient wisdom and modern science to help YOU become the best, most heroic version of yourself so we can create a world in which 51% of humanity is flourishing by 2051. Learn more at heroic.us.