



LOSING SLEEP AND LIVES: MATTHEW WALKER ON THE GLOBAL SLEEP EPIDEMIC



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Stephanie Sirota: Welcome to the RTW podcast. I'm your host, [Stephanie Sirota](#), Partner and Chief Business Officer leading the Strategic Partnerships team at RTW Investments. Today, we welcome [Matthew Walker](#), professor of neuroscience and psychology at the University of California, Berkeley, and the founder and director of the [Center for Human Sleep Science](#). He's also the author of the New York Times bestseller, *Why We Sleep: Unlocking the Power of Sleep and Dreams*, which will be the subject of our discussion today.

Matthew, thanks for joining us.

Matthew Walker: Thank you so much for having me.

Stephanie Sirota: I really, truly enjoyed reading your book. I have so many questions. I could start in a million different directions. But—

Matthew Walker: Dangerous, isn't it?
(LAUGHTER)

Matthew Walker's journey into sleep science

Stephanie Sirota: It sure is. Early on in the book, you said, "Addressing the question of why we sleep from an evolutionary perspective only compounds the mystery. No matter what vantage point you take, sleep would appear to be the most foolish of biological phenomena."

"You cannot gather food, you cannot socialize, you cannot find a mate, or reproduce, and you're vulnerable to predators. Sleep is surely the most puzzling of all human behaviors."

Is that what sparked your interest in sleep?

Matthew Walker: Most sleep researchers are accidental sleep researchers. I was studying people with dementia for my Ph.D., and I was looking at brainwave patterns and seeing if I could differentially diagnose them very early on. And I was failing miserably.

And then, one weekend, I was reading how the different sleep centers in the brain were affected at different levels in different types of dementia.

So I thought, "Gosh, I'm measuring my patients at the wrong time," which was when they were awake. "I should be studying them when they were asleep."

Started doing that. Got some amazing results. I then had to ask a question, are the sleep problems that I am seeing in dementia a consequence of the dementia or an underlying, contributing cause of the dementia?

I thought, "Okay, I now need to go and find out why we sleep."

That was 22 years ago. And now what I've learned is that hard questions don't care who asks them. They will meter out their lessons of difficulty all the same. And I have been schooled in the difficulty of sleep.

It is truly idiotic as a behavior.

Stephanie Sirota: You're paralyzed. You can't move.

Matthew Walker: Yeah, so you're vulnerable to predation. Sleep should've been strongly selected against in the course of evolution. Even very ancient species like earthworms, in every species that we've carefully studied, sleep appears to be present.

What that means is that sleep probably evolved with life itself on this planet.

And from that point forward, it has fought its way through, heroically, every step along the evolutionary path.

We now have to ask, is there any major physiological system in your body or operation of your mind that isn't wonderfully enhanced by sleep when you get it or demonstrably impaired when you don't get enough?

And the answer seems to be, no. It's fundamental to this thing called life.

Understanding the different types of sleep

Stephanie Sirota: So maybe start with the basics of sleep science. Can you tell us, is all sleep equal? What is the value, and the purpose, and the differences of REM sleep and NREM sleep?

Matthew Walker: There are two principal types of sleep: non-rapid eye movement sleep, or non-REM, and then rapid eye movement sleep. And non-REM sleep is further divided into two types, light non-REM and deep non-REM.

The light non-REM and deep non-REM will essentially play out in a battle for brain domination against REM sleep each and every night. Every 90 minutes and then replayed every 90 minutes.

The distribution of non-REM and REM within each 90-minute cycle changes as you move across the night.

In the first half of the night, the majority of those 90-minute cycles is comprised of lots of deep non-REM sleep and very little REM sleep. You get much more REM sleep in the second half of the night, and especially in the last quarter, and very little deep sleep.

No one stage of sleep is more important necessarily than the other. Different stages of sleep do different things at different times of the night.

What we don't still have an answer for though is why do we have all of our deep sleep in the first half of the night and it decays exponentially? And then why do we have all of our REM sleep in the second half of the night, which increases exponentially?

It's important to know that distribution difference. It has implications.

Let's say that I normally go to bed from 10:00 P.M. to 6:00 A.M., eight hours of sleep. But tomorrow I have to wake up at 4:00 A.M. You've lost 25% of your total sleep. But because REM sleep comes mostly in that last quarter of the sleep phase, you may have lost 40%, 50%, maybe even 60% of all of your REM sleep.

Stephanie Sirota: Now what happens if you have a late night and you go to bed at 12:00 A.M.?

Matthew Walker: You will still get some of the deep sleep that you would normally have obtained.

Non-REM sleep is a little bit more robust in terms of its resilience to the time of night that you go to bed. Two hours later in the morning versus two hours at the front end of the night, REM sleep will suffer more.

Stephanie Sirota: Can you catch up for lost REM sleep or for any sleep deficit?

Matthew Walker: In the book, I would've said, "No," that there wasn't evidence that sleep is like the bank, that you can accumulate a debt, and then hope to pay it off at the weekend.



And for most of the brain and body functions that sleep supports, that appears to be true. But there was a paper published that suggested the people who at least try to sleep in a little bit longer at the weekend, despite short sleeping during the week, reduced the danger of cardiovascular mortality by about 50% relative to those people who just thought, "Well, this is futile. I'm short sleeping during the week. I'm still going to short sleep at the weekend."

It's a complicated notion of sleep banking. So let's say that I go into debt. Can I repay that and get net neutral? The answer for the most part is, no. However, let's say that I am a high-powered business exec or doctor.

If in the week before, you know you're going to be sleep deprived, you add an extra hour of sleep, so you develop credit first, you can then spend that credit when you are facing a debt. So you can do sleep banking, as it were.

How to deal with jet lag

Stephanie Sirota: A lot of business executives will cross time zones for competitions, meetings, or conferences. How do you think about jet lag?

Matthew Walker: It's really about things that you do in flight and after you arrive.

The following regiment I would, "prescribe," is, as soon as you get on the flight, change all of the clock faces that you have to the time in the new time zone. I want you operating on the mental timeframe of the new time zone.

I'm a professor at UC Berkeley. I fly from San Francisco back home to London. London is eight hours ahead. I get on the plane. It's 8:00 P.M.

Because I've now reset my clock, I realize, "My goodness, it's actually 4:00 A.M. for me." So what I need to do is the exact opposite of what everyone else is doing on the plane. Once they feed me my meal, I am going to try and sleep, because my goal is to sleep in synchrony with the new time zone. I've set an alarm, and I will brute force myself to wake up.

Because then my goal is to try to accumulate at least 16 hours of continued wakefulness before I sleep that following night. The next thing, I abstain from alcohol and caffeine on the flights. Neither of them are your friends.

They will make it harder for your 24-hour clock to reset every single day. My goal once I land is get as much daylight as I can and exercise before about 2:00 P.M., even if it's just going outside for a 20-minute brisk walk. That's the goal: natural daylight.

If I really need it, I will strategically use a cup of coffee as long as it's not before 1:00 P.M., assuming a normal bedtime. Then, I will do the same thing. If I have to nap, I'll limit my nap to 20 minutes and no more.

And I'll cut myself off from napping at 2:00 P.M. After about 7:00 or 8:00 P.M., once I'm there in the new time zone, my only goal is to stay awake for as long as I possibly can.

I fight it and fight it.

Because I'm trying to build up that sleepiness. I usually take melatonin about 45 minutes before bed: low dose being about 1-2 milligrams and no more.

Then, I usually take a hot bath or a shower, which helps drop my core body temperature. If you nail your first night, you're golden.

Stephanie Sirota: You set yourself up for success.

Matthew Walker: After that, it's a regiment of 20 minutes of daylight, some kind of exercise, and then eat at the time when everyone else is eating, not at the time that you're hungry.

For every one day you're in a new time zone, your body will acclimate about one hour.

The effect of sleep on young adults

Stephanie Sirota: Let's go back to the evolution of sleep and how you think about it as a sleep scientist.

Our circadian rhythms change in different periods of life. In teenagers, their circadian rhythms get pushed back by a couple hours. What is the value of that? Why does that happen?

Matthew Walker: So it's not rebellion. It's biology. The 24-hour circadian clock, its peak and its trough get almost pushed forward in time.

So they naturally, biologically are now being hardwired to go to sleep two, three hours later than they were maybe two or three years ago.

Stephanie Sirota: Full disclosure. I have two teenage sons. I have been at my wits' end until I read your book. (LAUGHTER) And then I said, "Okay, they're actually not, not listening to me for fun." Why are teens hardwired to go to sleep later?

Matthew Walker: The theory right now is that this is the biological prescription for parental dislocation. It's now, "you need to fly the nest." Because at that point, the more important set of people that you need to interact with is not your parents anymore.

Stephanie Sirota: It's your peer group.

Matthew Walker: It's also the fact that they're trying to sleep off a terrible debt that the early school start time system has lumbered them with.

And there's some great evidence that when you delay school start times, academic grades increase.

Truancy rates decrease. Psychological and psychiatric referrals decrease. And life expectancy increases.

The number one leading cause of death in teenagers 16 to 18 is actually not suicide. That's second.

It's road traffic accidents. And here, sleep matters enormously.

I'll give you an example that came from Teton County in Wyoming, they shifted their school start times from 7:35 in the morning to 8:55 in the morning.

“There was a 70% reduction in car crashes 16 to 18. When sleep is abundant, minds flourish. And when it's not, they don't.”

Stephanie Sirota: So can you extrapolate from that: the reduction in car crashes is that because when you're drowsy driving you're just not as quick to react to things on the road?

Matthew Walker: The principal issue with drowsy driving and drowsy related accidents are what we call micro sleeps.

Your eyelid will just partially close.

You have no conscious perception of that happening. You're going offline for about one to two seconds. When you have one of these micro sleeps, there is a two-ton missile traveling at 60 miles an hour and no one is in charge.

And so, it's not that you respond too late. It's that you don't respond at all. So that may be the last micro sleep that you ever have.

The impact of sleep on productivity

Stephanie Sirota: If your reaction times are down, can that impact you in the workplace? Are you just not as productive or thoughtful?

Matthew Walker: Less sleep does not equal more productivity. Dr. Christopher Barnes at Washington University has done some great studies on this.



Stephanie Sirota: Does every person need roughly the same amount of sleep?

Matthew Walker: The number of people who can survive on less than seven hours of sleep without showing any impairment in the brain or the body is zero. Now, that doesn't mean, however, that there aren't some anomalies.

Seven to nine is what we recommend. There is a subset of individuals that we've studied that we call the genetic short sleepers. Six hours and 12 minutes they can get away with and show no impairment. There are at least two genes that we've identified. We've at least been able to create those genetic models in animals. And those animals survive just as long as their litter mates who are genetically normative.

That teaches us something fundamental about sleep biology. It means that there is somewhere a DaVinci code biologically that allows people to get done in six hours what most of us seem to require seven to nine hours to accomplish.

Now at this point, many people may be listening and saying, "Gosh. I think I'm one of those genetic short sleepers." Just to put it in context, based on the rarity of those genes, you are far more likely to be struck by lightning in your lifetime than you are to have one of those short sleeping genes.

If you are an under-slept employee, defined as sleeping less than six hours, you do not take on as many challenging tasks.

You produce fewer creative solutions as a response. When you're working in groups, you typically slack off and ride the coattails of other people's hard work. It's called social loafing.

You are more devious. So you're more likely to falsify receipts or falsify spreadsheet data as a consequence of being under-slept.

There was a great report by the RAND Corporation, and what they found was that insufficient sleep will cost most nations about 2% of their GDP.

So here in America, that number was \$411 billion.

Stephanie Sirota: Well, do some of these short sleepers also take naps?

Matthew Walker: They don't.

Stephanie Sirota: So if you're a napper and you take— I mean, these naps are 10 minutes, 20 minutes?

Matthew Walker: If there is the ideal protocol for a nap, it would be probably a 20-minute nap before about 2:30 P.M. in the afternoon, assuming a natural bedtime.

We've done a dose response curve with naps. Certainly, the longer you nap, the greater the benefits for brain and body. The problem is that if you go past 20 minutes, you start to go down into the deeper stages of deep, non-REM sleep.

Napping late in the afternoon is a little bit like snacking before your main meal. It just takes the appetite edge off your sleep hunger.

And therefore, you're not as tired as you would be or maybe you fall asleep fine, but you don't have enough of that sleep pressure weighing you down, so that you wake up in the middle of the night.

If you are suffering from insomnia, do not nap during the day. I want you to build up as much of that healthy sleepiness across the day to try to force you down.

Analyzing the dream state

Stephanie Sirota: There are some extraordinary examples that you have in the book about things that were invented or songs that were written—the Beatles, from your hometown. How does that happen?

“Last night, everyone listening as long as you slept, the two of us included, became flagrantly psychotic.”

Matthew Walker: Because last night when we went into REM sleep and we started dreaming, we started to see things which were not there, so we were hallucinating.

We believe things that couldn't possibly be true, so we were delusional. We became confused about time, place, and person, so we're suffering from disorientation. We had these wildly fluctuating emotions that we call being affectively labile.

And then, how wonderful, you and I, we woke up this morning, and we forgot most if not all of that dream experience. So we're suffering from amnesia. If you experience any one of those five things when you're awake, you would be seeking psychological assistance. But it seems to be a normal biological process. Why?

Stephanie Sirota: Does every person dream?

Matthew Walker: As long as you're not ingesting a collection of different substances that are very good at blocking your dream sleep, yes. Just because you don't remember your dreams does not mean that you are not dreaming.

So dreaming seems to have a benefit above and beyond the stage of sleep that it comes from, which is REM sleep. REM sleep serves lots of different functions. For example, in the body, it's the time when we release our peak levels of testosterone in both men and women.

REM sleep is important for hormonal health. But dreaming that sits on top of REM sleep has at least two unique benefits.

During deep sleep, we cement new memories. REM sleep then comes along after deep sleep and says, "You've now got updated memory information. I am then going to start connecting all of this new information with your back catalog of existing information."

So as a result, you wake up the next day with a revised mind-wide web of associations that's capable of producing innovative solutions to previously impenetrable problems.

And that's the reason that no one has ever told you, "Gosh, you know, Stephanie, you should really stay awake on a problem."

Stephanie Sirota: You sleep on it.

Matthew Walker: Dreaming is almost like a Google search gone wrong. During waking, we see the most obvious connections. We type in the search term, and it takes us straight to page one. However, with REM sleep, it's a fuzzy-logic algorithm. You insert the search term, and it takes you directly to page 20. So let's say I type in the search term, "RTW."

The REM sleep algorithm returns the first hit of some field hockey game in Utah. And you think, "Hang on a second. What now —?" but if you look, you think, "That's a strange association, but I can see it now."

Dreaming is almost sort of the algorithm bent towards highly associative, highly kind of hedged bets. Even if one in a thousand work, it still doesn't matter. If you fused things together that shouldn't normally go together, but offer a marked advance in evolutionary fitness, it sounds like the biological basis of creativity. Dreaming provides a form of overnight therapy. It's emotional first aid: a nocturnal soothing balm that just takes the painful, sharp edges off those difficult emotional experiences, so that when you come back the next day, you almost divorce the emotion from the memory.

There's a lovely quote by an American entrepreneur E. Joseph Cossman. "The best bridge between despair and hope is a good night of sleep." That's exactly what dreaming is all about.

Sleeping, dreaming, and the relationship with mental health

I should also note, in the past 20 years of studying sleep, we have not been able to discover a single psychiatric condition in which sleep is normal.

“And that tells me everything I need to know about the intimate relationship between your sleep health and your mental health.”

Stephanie Sirota: I guess that kind of begs the question, what comes first?

Matthew Walker: For a long time, psychiatry thought that the sleep disruption was the consequence of the mental illness.

It's certainly very much a two-way street. And is the traffic flowing more dominantly in one direction than the other?

Stephanie Sirota: How do you explain situations where veterans that have PTSD or someone that has experienced trauma cannot just sleep it off and disassociate the emotions from that memory?

Matthew Walker: The quintessential disorder where that form of overnight therapy fails is PTSD. Because you cannot receive a diagnosis of PTSD without having repetitive nightmares. With PTSD, you are offering up to the brain this highly charged trauma memory and saying, "Please, sleep and dreaming, can you do your elegant trick of stripping the bitter rind from the informational orange," as it were.

And it fails. It turns out that one of the reasons that dreaming provides this emotional benefit is that it's the only time during the 24-hour period where a stress-related chemical in the brain called noradrenaline is shut off entirely.

And so, when we're sleeping normally, dream sleep provides the perfect therapeutic chemical cocktail for reactivating the emotional and memory centers of the brain but doing it in a "safe neurochemical environment."

In the cerebrospinal fluid of patients with PTSD, they have abnormally high levels of noradrenaline. So I presented this paper, at a conference.

That afternoon, a psychiatrist from Puget Sound, Murray Raskind, presented some data saying, "I am perplexed. I've got war veterans, PTSD patients in the VA system. And I've been treating them with a generic blood pressure drug, because many of them have hypertension, called prazosin."

And he was saying, "I've been treating my patients with prazosin. And they're coming back and saying, 'Gosh, my nightmares are starting to dissipate and I'm feeling better.'" What he'd inadvertently discovered was proof of the model, which is noradrenaline is too high.

In the brain, prazosin will block noradrenaline. It brings them back down to baseline levels during REM sleep. And all of a sudden, the trauma memory can be actually processed.

The future of sleep studies

Stephanie Sirota: What advancements have you been able to make in sleep studies? Where are we going in the next five, ten years?

Matthew Walker: We've got sufficient data that sleep is the Swiss Army Knife of health. Now the question is, "I'm struggling with sleep. And help me solve that."

So I've got to come up with devices, technologies to help assist human beings or even augment human sleep.

Stephanie Sirota: Are you wearing an Oura ring?

Matthew Walker: I am wearing an Oura ring. I do think there's an immense amount of value in those devices. I think we're doing a great job at tracking sleep.

But what I don't think we do a very good job of is telling you, what does it mean? What should you do about it?

I have a sort of concierge sleep practice. I'm working with high-net-worth individuals. I create this 25-page deep analytics report. We have a database of millions of hours of sleep.

I can cluster the data with analyses and say, "What predicted your good nights? What predicted your bad nights?"

Now we're starting to move into the realm of precision medicine. Why you have good nights may be very different to why I have good nights.

Stephanie Sirota: And then those good nights or bad nights can have a knock-on effect of your next day.

Matthew Walker: But what if you were to have this rich, intense report that describes all of those factors?

We tell you, "Looking at your data, this is what our personalized sleep prescription is going to be for you, the individual."

You can just go to something called nightfalliq.com. We've got a wait list, but you can sign up. Just say, "I heard you on the RTW Podcast. Put me at the top of the list."

Sleep as the foundation of health

Stephanie Sirota: In the book, you write about getting a vaccine and your body's ability to make antibodies if you go in for your flu shot, if you're well-rested versus when you're not.

Matthew Walker: Yeah. The state of immune deficiency that happens by way of insufficient sleep now, I think, is really quite robust.

There's a great study by Michael Irwin at UCLA. And what they found is that if you put someone on just four hours of sleep for one single night, there is a 70% drop in something called natural killer cells.

They're very good at identifying dangerous, unwanted elements, and eliminating them, particularly cancerous cells.

Eve Van Cauter at the University of Chicago did this study, and they short slept individuals for about four or five nights, gave them about five hours of sleep leading up to the vaccine.

There was a 50% reduction in antibody production under conditions of sleep deprivation, therefore rendering those individuals and that vaccination largely ineffective as a consequence.

And they also said, "Well, let's keep giving them lots of recovery nights of sleep. And then we'll test them again for the antibodies to see if it just took them a little bit longer to mount an immune response and become successfully vaccinated." It never, never appeared.



Stephanie Sirota: Where do you think we're going with this? And how many more people need to appreciate sleep as an important pillar of health?

Matthew Walker: I think sleep is becoming a little bit less of the neglected stepsister in the health conversation of today. That's due to all of my colleagues and their remarkable work. It's not just about exercise, or diet, or sleep. It's about exercise, diet, and sleep, and mental health. And you need to be coalescing all of those together. Having knowledge of your sleep is only going to empower your healthcare team around you and you to optimize your sleep strategy to try to see if you can elongate not only your lifespan, but, more importantly, your health span.

Stephanie Sirota: What's your goal this year personally or on the research side?

Matthew Walker: I still believe that we're going through a global sleep loss epidemic.

“My goal is to try to reunite humanity with the sleep it is so desperately bereft of with compassion and with understanding, rather than catastrophizing it. ”

Stephanie Sirota: This was extraordinary. I could keep you here until we all fall asleep.

Matthew Walker: Let's push on through till dawn. Shall we, Stephanie? (LAUGHTER)

Stephanie Sirota: Thank you so much, Matthew. This was an extraordinary discussion. And you are doing extraordinary work.

Matthew Walker: Thank you again for having me.

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