

## [Transcript] The Diary Of A CEO with Steven Bartlett / E228: The 6 Hacks To Sleep Fast Tonight: Matthew Walker

When you're struggling with sleep in the middle of the night and you're wide awake, in the last hour before bed, try this experiment.

There's a global sleep loss epidemic shaped by this thing called the modern world.

What society wants is that you're either producing or you're consuming.

In fact, the CEO of Netflix's statement was that we are to commit war against sleep.

We have this mentality in business. Less sleep equals more productivity.

That is just not true. Insufficient sleep costs most nations about 411 billion dollars.

Your rates of obesity, cardiovascular disease, mental health conditions,

all of these things escalate. If that wasn't bad enough,

oh god. If you're not getting sufficient sleep, then 60% of all of the weight that you lose will come from lean muscle mass and not fat. Not the muscle. How would you redesign society to help us to sleep better? So first I would. It feels like caffeine is a miracle drug with no

apparent cost. Was I wrong or was I right? Wrong. Caffeine will hurt your sleep in three ways.

Most people are not aware of. So if you have a cup of coffee at midday, what happens is that

Matt, I have spent the longest time trying to sit down with you on this podcast.

So I'm very, very happy to spend some time with you today.

And that is because your work is now world renowned and it's very, very important work.

But as is the case with a few of the recent episodes on this podcast, I wanted to start by asking you, in your view, what is it you do and why is it so important in your mind that you do it? Well, firstly, thank you so much for having me here and having this conversation.

It's an incredible privilege to sit with you. Why do I do what I do and why do I think it's important? Sleep, I would argue, is the single most effective thing that you can do to reset your brain and body health. And I don't say that flippantly. It's not as though I'm dismissing

exercise or diet. Those two things are absolutely critical. But if I were to take you, the individual and deprive you of exercise for a day, deprive you of food for a day, deprive you of water

for a day, or deprive you of sleep for a day, 24 hours. And I would to map your brain and body impairments. It's not even a competition that one night of lost sleep relative to those other

things, it dwarfs you. The only thing I lose out against is oxygen. If I deprive you oxygen, you're going to pop out of existence a little bit quicker than you will with a lack of sleep.

So sleep to me, I think, is the elixir of life. It is your life support system. And as best we can tell, I would argue it's Mother Nature's best effort yet at immortality. And so in that regard, that's why when I look across all of the studies and all of the data, it's so compelling to me.

And part of the reason I think it's, I've desperately tried and I haven't done a good job, but I've tried to offer some public mission of reuniting humanity with the sleep that it's so

bereft of, is because it does appear that there is a global sleep loss epidemic. If you look at the numbers, people are struggling so desperately with their sleep. So we have all of this knowledge,

this incredible knowledge of sleep and how important it is. And it's a perfect storm colliding with this great sleep depression in modern society. And for that reason,

I just felt as though, what can I do to try to help offer this voice and this science?

And I am but a scientist and I stand on the shoulders of all of my colleagues and all of these giants in the field. I'm just a researcher. So that's a little bit about, I guess, who I am, but more about why I do it and why I think it's important.

If I were to try and define your sort of, and this, I hate doing this because it requires

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the application of some kind of narrow label. If I was to try and define what your title is, in your own words, what would that be?

So I'm just a professor of neuroscience of brain science at the University of California Berkeley. I am not a medical doctor, just FYI for all of the things that we will talk about in this conversation. So I'm just a PhD. Just a PhD. That's incredibly humble of you, but I would assert that you're, without a shadow of a doubt, the leading author, scientist, commentator, voice, as it relates to the topic of sleep. And my question from that is, where did that begin?

Like where did that start in your life, in the journey of your life?

When did sleep become the thing?

It occurred to me or happened to me, I should say, when I was doing my PhD. I was studying people with dementia and we were trying to understand what type of different dementia that they had very early on in the course of their disease. And we were looking at patterns of brainwave activity. So I was placing electrodes all over the head and I was measuring them and I was trying to differentially diagnose them very early on. And I was getting no good data what surfers, miserable, nothing was landing. And one day I went home at the weekend and sort of with all of my printed journals and I go to my doctor's residence and have this sort of igloo of journals around me that I would sit and read at the weekend. And I was, which probably tells you everything about my social life with the weekend, if that's what I was doing. But so I was reading these journals and it occurred to me that some of these dementias were eating away

at the sleep centers in the brain and others would leave them untouched. And at that moment, I realized I'm measuring my patients at the wrong time. I'm measuring them when they're awake. Should be measuring them when they're asleep. Started doing that got amazing results.

And at that point, I wanted to ask the question, well, I wonder if their sleep problems are not simply a symptom of the dementia. I wonder if it's a potential cause of the dementia.

And at that point, I started to think, well, so then what is this thing called sleep?

And what I learned is that some of the greatest minds in the past 100 years had tried to answer a very simple question. Why do we sleep? And, you know, 30 years ago, in fact, the crass answer was that we sleep to cure sleepiness, which tells you nothing about, you know, it's like saying, I eat to cure hunger. Well, no, that's not the right answer. Now, 30 years later, we've had to upend the question. And we now have to ask, is there any physiological system in your body? Is there any operation of your mind that isn't wonderfully enhanced when you get sleep or get sleep or demonstrably impaired when you don't get enough? And the answer seems to be to be no

there. So my journey into the science of sleep really was an accident. But at that moment in time, when I started reading about sleep, I utterly fell in love with the topic. And it is a love of fur that has lasted me over 20 years. I think it is the most beguiling topic in all of science.

I'm biased, of course. And I will never study anything different. I know that now. I'll study it to the end of my career and until the end of my life. Wow. I've never heard anybody say to me on this podcast that they would study the same topic for the rest of their life. And you're a young man. That's a, you've got a long way to go. Especially the amount you've been sleeping. That's very kind of you to say. I wish I'm moving into the foothills of middle age rapidly. But no, I, I'm so fortunate in what I do to have found it or for it to have found me. You know,

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if I won all of the money in the world tomorrow, I would genuinely, genuinely not do anything different. I am so fortunate. Well, I probably start trying to fly like business class or first class. That would be nice. But other than that, I would do nothing different. And I am very mindful of that because that sounds very privileged. And I know a lot of people enjoy what they do for a living rather than enjoy what they do for a living. And I know how lucky I am. So I don't mean to be dismissive of people in that regard. I just know how much I love what I do. You asked a question there, which is you posed a question which many people have tried to answer. You gave the answer from 30 years ago about, you know, why do we sleep? And it dawned on me as you said that, that I've never asked myself that question. I've never even pondered the thought of why I sleep. I mean, I know what happens when I sleep. But do I know why my body can't just find another way? Why can't my body stay awake for the 24 hours? I know some animals, they sleep half their brain and then the other half kind of has an app and whatever. Why, why, why do we sleep? It's a puzzling question because when you think about it from an evolutionary perspective, it makes no sense whatsoever. Sleep is utterly idiotic because when you're sleeping, firstly, you're not finding a mate, you're not reproducing, you're not foraging for food, you're not caring for your young, and worst of all, you're vulnerable to predation. Now, on any one of those grounds, but especially all of them as a collective, sleep should have been strongly selected against during the course of evolution. But from best we can tell, sleep evolved with life itself on this planet, and it has fought its way through heroically every step along the evolutionary path. And what that has told us is that sleep must be essential at the most basic of biological levels. And now we understand that Mother Nature didn't make a spectacular blunder with this thing called sleep. Sleep, for example, will restock the weaponry in your immune arsenal, and it will make you a more immune sensitive individual. So you're more immune robust when you wake up. We also know that it regulates your blood sugar levels, it controls your appetite hormones, it also regulates your sex hormones, testosterone, estrogen, sleep upstairs within the brain will fixate memories and help you learn and remember sleep will de-escalate anxiety, it will reduce your emotional difficulties and traumas, sleep will actually cleanse away the Alzheimer's toxic proteins that build up in the brain. The list is endless, these are all of the reasons that we need to sleep. But why can't I just do what those animals do where they half of their brain falls asleep, half of the brain stays awake. Is that at all linked to the fact that we live in tribes, so we are essentially, although we're, you know, there might be 10 people in the tribe, we're all 10% of the tribe, so we can rest at different times and kind of cover each other's backs or... Gosh, yeah, so actually there are two nested, very insightful questions there. The first is this notion of what you're describing which is what we call unihemispheric sleep, which is just a fancy way of saying you can sleep with one half of your brain and the other half is wide awake. Now there are only a few species that can do this, for example aquatic mammals, dolphins are a great example, we can place actually electrodes on their heads and you can see that one half of their brain will be fast asleep, it will be in deep, deep non-rem sleep, the other half of the brain will be frenetic, wide awake. And in part for them, the reason is because they need to maintain aquatic mobility, you know, they need to keep surfacing for air otherwise, you know,

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that's not going to be a good outcome. We also know that birds or many avian species will have unihemispheric sleep. And you can actually see this, there's some great YouTube videos online where they will film one half of the sort of the side of the bird's face and the eye is closed and what it means is that the other half of the brain, because the brain is actually the left half controls the right side, the right side controls the left side, so that left side is now fast asleep, which is the right eye closed, and then you kind of pan around and all of a sudden the other eye is wide awake and it's clearly looking about. Now this is obviously not for aquatic surfacing to gain air, this is for a different reason. What happens is that in a flock, a bunch of birds will all land on a branch. Now all of the folks in the middle, they get to sleep with both halves of their brain, they can sleep with both halves or just one half. All of the folks in the middle, they get to sleep with both halves. The unfortunate girl or guy who sort of lands at the end of the far end, they will actually sleep with one half of their brain. So one half of the flock, the entire flock, has one eye, 180 degrees of sort of half panoramic view out. The other bird on the other end will have the other half of the brain asleep with the other eye awake, giving the other 180 degree view of protection vision and therefore the entire tribe has a 360 degree assessment. Now you would think in fairness that once those guys or girls at the end have done their duty, they get to move into the middle and they get to sleep with both halves. No, that's not what happens. What they will do after a while is that they will stand up, they will turn around 180 degrees, sit back down and switch the other sides of the brain. So to just be clear, the complexity of wiring and architecture that has to happen for one half of the brain to be deep in sleep and the other half to be wide awake is astronomically hard. I mean, it's incredibly difficult to create that wiring. What that tells me is that if sleep was dispensable, if it was negotiable, then Mother Nature would have just found a different way for us to get all of these brain and body benefits and not gone to all of the evolutionary trouble of figuring out this fancy wiring for half brain sleep. In other words, you just can't get away from sleep. You have to sleep. But your second question I think is even more fascinating, which is us as a tribe, because we are a tribe species. Now, there is something else that we call your chronotype. Are you a morning type, evening type or somewhere in between? And by the way, you don't get to decide. It's not your choice. This notion of these go getter type A's who say everyone has to be awake at five in the morning. You go to the gym, you blast out a workout for an hour and you're at the desk by six a.m. You have no choice. If you're an evening type, you're an evening type, it's hard coded. We know that right now there's at least 22 different genes that dictate what you are morning type, evening type or somewhere in between. And it's about a third third split across the population. Why is it a split? Why are we nicely spread out across our chronotypes for exactly the reason you described? Because when we're in a tribe, if we all sleep at the same time, we're all vulnerable for eight hours. But if you were to insert some genetic variability into when people have a desire to sleep, you've got the morning types who maybe go to bed at nine p.m. and are waking up, let's say at five a.m. And then you've got all of the extreme evening types who are going to bed at two a.m. and waking up at maybe 11 or midday. So that way, everyone gets their eight hours of sleep. But the entire tribe, the nucleus of this group of Homo sapiens themselves is only vulnerable for maybe just two or three hours. So it's a clever solution that Mother Nature has come up with to say, everyone gets their eight

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hours. But as a species, you're only going to be vulnerable for two to three hours max, when everyone at least as a collective is sleeping. Absolutely genius.

I used to think it was a load of nonsense, this chronotype thing. It was actually on this podcast where I learned about its existence. And then I went on YouTube to learn more and your video came up if you're explaining it, because I thought I always pondered why my partner goes to bed super early, wakes up super early, I go to bed late, wake up late. I'm going to ask you this question actually because I've wondered this. In that situation where I'm sleeping in bed with a partner that has a different chronotype, it can have an impact on my sleep, right? Because of the way that our sleep cycles work and the REM sleep and the stage one, deep sleep, etc, etc. If she's waking up when I'm pulling into REM sleep, if she's waking up at 5am, but at 5am, because I've gone to bed late and my REM sleep has just begun, that has quite a significant impact on me, right? If she is waking you up, yeah, if she wakes me up, then it's non-trivial. And likewise, if you're waking her up as you're getting into bed on the front end of sleep. So it's very difficult. One of the things that couples will cite if they break up firstly is usually about a third of them will cite sleep difficulties or sleep issues as a cause of their breakup, or at least as a contributing factor to that breakup. One third. Yeah, that it's one of at least one of the factors. When you go then in and when you double click to say, okay, then what is it about this sleep kind of tension between the two of you? One of those things is a mismatch in chronotype. And you can see this when, you know, people, I think there's, you know, on dating profiles now, someone was telling me, people will even say like, I'm a morning type or I'm an evening type, as if you're stating up front, this is part of my identity and just FYI before warned, because maybe it's been an issue for them in the past. This is why I often speak about the notion of what's called a sleep divorce to prevent a real one. Now, it's not for everyone. A sleep divorce is where you sleep in separate locations. And when we've surveyed people, both use it in the from the sleep council in the United Kingdom and also in the National Sleep Foundation here in America, the data is about the same, one in four people will say that they sleep in different locations with their partner. So almost a quarter of people in relationships will sleep in different locations. We think it's potentially an underestimate because if you survey people anonymously, then a third of them will report waking up at least in a different location the next morning. And part of the reason that it's a taboo is because people think, well, if I'm if we're not sleeping together, then we're not sleeping together. The exact opposite is true that when a couple is sleeping well, we know that the sex hormones are improved testosterone and men estrogen and leasing hormone in women. We also know that your desire to be intimate with your partner has increased. What we found is that for an hour of extra sleep, if a woman gets an hour of extra sleep, her libido desire to be intimate with her partner increases by 14%. Now, to give you some context, the FDA drugs for improving or increasing libido in women, drugs such as Vylicic here, clinical drugs, they will increase it by about 24%. And that's a pharmacological agent. But here, just the added nonpharmacological benefit of one hour of extra sleep will get you more than 50% of the way there. So I want to just remove that notion of the stigma of that if you're not sleeping together, you're not sleeping. It's usually quite quite the opposite. I would say that part of the challenge, though, is that that if we look at all objective measures, if I measure your sleep and the sleep of your wife, if when you're sleeping separately versus when you're sleeping together, it's very likely that



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objectively you will both be sleeping worse when you're sleeping together. That's what the science tells us. However, what's interesting is that when you survey people and say, how satisfied are you with your sleep, which is a subjective measure, people will say, I'm actually more satisfied with my sleep when I'm with my partner than when I'm sleeping alone. So there's a mismatch here. Objectively, your sleep is better, but subjectively, you still prefer that. And of course, it's natural. There is safety, there's security and co-sleeping. There is this sort of connection that we get. You can approach it if you want, just be honest with yourself and be honest with your partner. And you can start by saying, look, this isn't forever. I just want to say let's do an experiment for a week, 10 days. Let's just try it and see how it goes. It doesn't need to be permanent because what you actually miss are the bookends of sleep. For the most part, the two of you are not conscious for most of the experience of sleeping together. It's really getting into bed and sort of having a kiss or a cuddle and sort of waking up together in the morning and sort of... Now, obviously, when you're a mismatch chronotype, that's also can be a challenge too. So you can still have a sleep divorce, but you can set up a system where you will go in and you'll say, you're good nights and you'll kind of get into bed, have a kiss and cuddle, and then you retreat to a separate location. And you can repeat that same process. So I don't want to sort of belabor the point of a sleep divorce, but people can certainly explore it. There is something called a halfway house, which is called the Scandinavian method, which sounds far more salacious than it actually is. It's simply that you buy two beds and you put them side by side in the same room, and therefore the amount of disruption, physical disruption that happens by way of sheets and movement is decreased. But that doesn't solve it all. Sometimes there is snoring. Sometimes there is sleep talking. Those things are not obviated by the Scandinavian method.

When you think about where society is, I was going to ask you, you said you wanted to do the work you're doing now for the rest of your life. So do you think the work you're doing now is going to become increasingly more important and relevant? i.e., is the problem going to get worse? Or is it going to become less significant and less relevant based on the trajectory of society as you see it? You know, I'm mixed. I think when I wrote the book, I started writing a book that was called *Why We Sleep*, back in probably about 2014 or 15. And at that point, sleep was the neglected stepsister in the health conversation of that day. You know, we were speaking a lot about diet and exercise, which was wonderful, but there was no voice of sleep.

And I was so sad about that because I could see so much disease and suffering that was coming so clearly by way of a lack of sleep. But it wasn't there on the public buffet menu for consumption of knowledge. And so that was part of the motivation for trying to write the book. So I would say now,

and this is not because of me or the book or anything like that, but is sleep more of a conversation in this day and age than it was six or seven years ago? I think I would say yes, there is a greater awareness of sleep. But with that awareness, I think one can still question the pragmatics, meaning just because we're talking about it more does not mean that people are still failing to either get the sleep that they need, or that they are unable to get the sleep that they need. And those two things are different. One is that you are healthy and you can generate the sleep that you need, but you don't give yourself the opportunity time or life, I should say sometimes

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because it's sometimes not your choice. Life does not give you the chance to get sleep. And if only you had the chance, you could sleep. That's one version. The second version is, no, I'm giving myself the right opportunity to sleep, but because I'm anxious or because of other issues, I am not able to generate sleep. I suffer from insomnia and sleep problems. So those two things I don't see having changed since, you know, I think this public movement, this increasing movement of sleep conversation came on the table. So in that regard, I'm more pessimistic than I am optimistic. And I think it will only get worse if you look at rates of insomnia, for example, they're only increasing, they're only escalating rates of anxiety disorders, the very same thing. And those two things are intimately intertwined. So I think I wish my mission was extinguished within the next couple of years, because society started sleeping wonderfully

well. I don't think that's going to be the case. So I think I've got my work cut out for me to try and help people with better sleep. So it's getting, we're getting worse at sleeping. I think modernity is making it so much more difficult for us to sleep. Modernity. I think when you think about, you know, we often think about sleep as a biological process and it very much is.

And but also it's so environmental as well as biological, meaning when you were to say, you know, how did you sleep last night? Think about all of the external factors that changed it. Well, I had to be up at this time. I had to catch a flight this time. My partner went to bed at this time and she woke up at this time. There was this noise that sort of happened. I'm now sleeping in a hotel room. You know, there are countless externalities. And those externalities are shaped by this thing called the modern world. And in the modern world, if I could really be cynical and I'm not someone I'm very optimistic and I'm very non cynical, but you could argue from a capitalistic standpoint that society does not want you sleeping. Because what society wants from a capitalistic point of view is that you're either producing or you're consuming. And when you're sleeping, you're neither producing, you're neither consuming. And so there are lots of ways that I think society and the modern world has conspired willfully or not conspiratorily or not to decrease and try to diminish sleep. In fact, I think the CEO of Netflix several years ago, and I'm sure that YouTube comments will correct me if I'm wrong here. But I believe his very statement was that we are we are deciding to commit war against sleep.

That was their goal. And it just stunned me that, you know, that we're going to go to war with sleep. We're going to remove you from your sleep. So there are lots of ways in which I think society does not help us. Light is another good example. We are a dark deprived society in this modern era because we're exposed to light. We are not giving ourselves the right temperature cues. You know, we go into an office where it's, you know, 20 degrees, 70 degrees Celsius, whatever it is, stock stable, then we come home and we regulate our temperature at home to be the same thing. We

take on board probably too much caffeine in this day and age, although I am actually an advocate of drinking coffee and I can explain why too. But anxiety, as I said, is a huge issue. All of these things are preventing and classic roadblocks to sleep.

How many of us are getting the sort of recommended daily allowance of sleep as a percentage, do you know? It seems to be about one third of most modern civilizations are failing to get the recommended seven to nine hours of sleep a night. One third. So roughly 35%, 33% roughly. Yeah. And does that have geographic variants? I in some countries it's worse in some countries

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it's better. I'm thinking about the UK versus the US or, you know, Japan or whatever. Yeah, it is. And in fact, you let me give numbers to the three countries that you described here in the United States. The average amount of sleep that people are getting is six hours and 29 minutes in the UK. It's not much better six hours and 49 minutes. Japan was the worst six hours and 22 minutes. Now, to be clear, that's the average. What that means is that there is still a large proportion of that bell shaped distribution of people getting even less than that amount. Now, there are some countries that you look at that are actually sleeping much better than that. I think Mexico, for example, is doing very well. If you look at Mexico City, people are actually sleeping and not too far off from eight hours. So there is variability and we can try to understand why, which by the way just brings me back while I think about it to your comment of, will my work be done? Not from the, because I'm a scientist and I do, I have run a big sleep center at UC Berkeley, but the work I do is hopefully a public advocate for sleep. Why I don't think it's going to change anytime soon is because governments aren't really doing much about it. And I've tried as best I can. And if there is any government out there that listens to this that wants to work with me, I'd be delighted. I don't remember and maybe you can, but any major First World nation government that has had a public health campaign regarding sleep. And it stuns me because those same governments have had public health campaigns regarding, you know, eating, regarding smoking, regarding drunk driving, regarding risky behaviors, safe sex, loneliness, loneliness, mental health, suicide. Where is sleep in that equation? And it's such a fundamental ingredient. And in fact, almost all of those things that I've just described have an intimate relationship with sleep. I mean, suicide, especially we were starting to do a lot of work with this, although it's been hard to get funding. But what we found is that insufficient sleep is a precursor to suicide. That sleep disruption seems to predict both suicide ideation, in other words, suicidal thinking, suicide planning, and tragically suicide completion as well. So if we were to try to have governments create a public health campaign to pull this Archimedes lever on better sleep, there are so many other health benefits, you know, sleep is the tide that rises all the other health boats. It's almost like a, it's like a mixing deck in a studio, you know, in those sound studios where you've seen it. And then there's that one button all the way to the end, the white button, sort of that when you move it up, sort of all of the other dials, the sort of the red, yellow, orange, green dials, they all move up at the same time as well. There's this sort of one mess, there's like one ring to rule them all. Sleep is that Archimedes lever. So if governments could only execute on that, the health benefits would be manifold in terms of their consequences. It begs the question, you know, if I were to make you today, president, prime minister, whatever, of the world, and you had to do, you know, just a few things to really fix the lack of sleep epidemic, there you go, diagnosed it. And what would those things be if you were in charge? How would you redesign society to help us to sleep better? Gosh, it's such a good question. And I've thought a lot about this, almost in reverse, which is to say, why is it that we are struggling to get sleep? And there is no single answer. There are so many different reasons. And that's why it's actually a very challenging problem to solve. I would go through a descending level of steps. So first, I would start at the government level, and we would get those public health campaigns in order.



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Next, I would go to the professional level, because there we have this mentality in business that, you know, sleep is for the soft among us, that less sleep equals more productivity. And that is just not true. And I can provide you with all of the evidence. So we need to get rid of this sort of sleep machismo attitude in the workplace, where we work where our badge of honor of sleep deprivation on our arms, we need to get companies to actually start embracing sleep. And I can guarantee you, and I can give you all of the evidence as to why if as a company, as a CEO, if you start prioritizing the sleep of your employees, you will be far better off as a company, you will be more product based, and you will be more profitable and revenue generating.

Sleep is the very best form of physiologically injected venture capital that you could ever wish for. And in fact, the Rand Corporation, which is an independent survey corporation, what they found is that at a national level, insufficient sleep costs most nations about 2% of their GDP. So here in America, that number was \$411 billion of loss profit caused by insufficient

sleep. In the United Kingdom, it was over \$50 billion. In Japan, it was over \$120 billion.

If I could solve the sleep loss crisis in the workplace, I could perhaps double the healthcare benefit for many of those countries, or I could halve the the education deficit in those countries. So the next level I would target is at business, then next step down would be medicine. Medicine is a classic demonstration here. We have junior doctors or here in America, they have doctor residency programs, where people are working 20, 30 hour shifts. And so already doctors are inculcated into the mindset of the uselessness of sufficient sleep. Across numerous countries, and I think it was maybe over eight different countries, we looked at the medical curricula, and we asked how many hours of education do doctors get about sleep? And what's strange is that, you know, often doctors, what you go in and you'll have an appointment, they'll say, okay, you know, how are you eating? And, you know, what's going on with the bathroom? How's the toilet? And then, you know, how are you sleeping? As if sleep is one of these universal health barometers. But what we found is that most doctors will only be given about an hour to an hour and a half of sleep education during their entire medical school education, which blows my mind because it is one third of their patient's lives. But they're only given about 90 minutes of education. So no wonder your doctors aren't treating your sleep problems, thinking about your sleep problems, understanding your sleep, it's not their fault. And plus, they're sleep deprived anyway, when they're being trained. Ironically, by the way, doctors, junior doctors who've worked a 30-hour shift, when they finish that 30-hour shift and get back in their car, they are 168% more likely to get into a car accident because of their lack of sleep and end back up in the emergency room from where they were just working, but now as a patient. I mean, this, the paradox, the irony just stuns me. So I'd next move down to the level of medicine. Then I would go to education because we don't get taught about sleep in schools. I never got one of those special classes. I got sort of sexual education classes, classes about drugs. No one came in and told me about the benefits of sleep. Why aren't we doing that? Then next, I would move down into the family because there is prejudice in families with sleep. It's this notion of parents of teenagers. And these teenagers, by the way, it's not their fault. They have a shift in their chronotype, in their circadian rhythm, that when they go through puberty, when they're going through adolescence, they get fast forwarded

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in time. So when they were eight or nine years old, they would be going to bed sort of early in the evening. But now as teenagers, they seem to be stubborn and they're staying awake, staying awake until midnight 1am. And they won't get into bed. It is not their fault because they have a biologically wired shift in their tendency of when they want to wake up and when they want to sleep. Why am I bringing this up about this sort of mismanagement in the home? Because parents at weekends, they'll go into the room of the teenagers, they'll pull open the curtains, they will pull the covers off and they say, you're wasting the day. And firstly, what they're doing is probably trying to sleep off a debt that we've lumbered them with during the week because of this incessant model of early school start times, which I'll come back to. But within the home, if you ask parents of teenagers, what percent of parents think that their teenagers are getting sufficient sleep? And about 70% of them will say, yes, my teenager is getting sufficient sleep. When you look at the data, only about 15% of teenagers are actually getting the sleep that they need. So what happens is a parent to child transmission of sleep neglect. They're saying you're lazy, you're slothful. So then what happens? Well, in 15, 20 years time, now that teenager has got a teenage child. What do they do? They go back in the room, they rip the curtains open, they say, you're wasting the day because that's what they were told. So we need to break that down too. And then finally, we need to come to the individual and we need to solve the individual's sleep problems. So it's a very long answer. And I'm desperately sorry to a very big question as to what I would do if I was off for a day. But I hope that gives you some sense of the depth that I think we need to go to. I've tried to think about the question a lot. It's not particularly well executed. I don't think I was very eloquent there, but I hope that gives a sense. It sounded perfectly eloquent to me. It sounded like a manifesto. So hopefully if there are people listening from governments, which I'm sure there are, because I hear about that sometimes, which is quite bizarre, but I'm sure they'll be getting in touch with you very quickly. Going back to the top of that, that stack on the company level, so as a CEO or a CFO or an employer, whatever, there are some companies that are incentivizing their team members to sleep, right? Is there any data showing the efficacy of that? There is data that we have and it's bi-directional, both the efficacy of when you increase sleep and also the detriment when you don't allow sleep. So a great example was NASA back in the 1980s. They were looking at using NAPS in the astronaut program because when you're up and you're orbiting Earth, you will actually be cycling Earth really quite quickly and you will get to see, depending on the orbit, maybe somewhere between 10 to 15 sunrises every 24 hours, which sounds amazing and remarkable, but trust me, in terms of your sleep, it is very dislocating. So they were looking at how to use NAPS strategically to improve performance because the weakest link on any space mission, and we've done some work with NASA, is the human being themselves and they can cause catastrophic failure. Now, if you make an error at work and you're here terrestrially on the ground, it's probably non-trivial. Make an error when you're up in space, it can be a big deal. So they were looking at that and what we found was that these NAPS anywhere between 20 minutes to an hour could increase productivity on these different tasks by about 34% and increase general alertness by over 50%. And in fact, the data was

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so powerful that it ended up being transmitted to all of the terrestrial workers on the ground that NASA would start to, it was what was called NASA NAPS. It was a NASA NAP culture. Now, NASA isn't desperately compassionate by any means, it's a great organization, but they just like companies like Google or Facebook, they understand the pounds and pennies sense, you know, the dollars in the sense version of productivity. So anything that returns productivity, they will invest in and some of those companies, you know, I did some work at Google during a sabbatical and there on their campus, they will have these NAP pods and they will have these what are called shrooms, where you can go and you can take a nap. So think about 20 years ago, you would never imagine a company paying you to sleep on the job. If you have caught sleeping on the job, you'd probably be fired. Now companies are incentivizing it, not because they are thinking compassionately or empathetically about the health or the wellness of their individuals. It is because they understand that it transacts marked productivity. So NASA was a good example when you give sleep, you get something back, but I can go back to the reverse of that. Why we think that a lack of sleep does not equal more productivity is for at least five reasons. First, when you survey and we've we can do these studies in the in the laboratory too, when you under sleep employees, they will choose less challenging problems. So if you give them an array of work problems, they will just simply, you know, check email, they'll listen to phone messages, they don't dig into deep project work. Second, of the problems that they do take on in their work, they will produce fewer creative solutions. And after all, creativity and ingenuity are supposed to be the two engines that drive businesses forward in terms of the productivity in their revenue. The third interesting finding that we've discovered is that when under slept employees start working in teams, they will slack off, they won't do their work, they will let other people do their work. It's what we call social loafing. So they ride the coattails of other people's hard work, which won't breed a good atmosphere in your company. You know, trust me, the fourth thing that we found is that under slept employees are more deviant, that they're more likely to fudge data in spreadsheets, they're more likely to falsely claim money for reimbursement that was inappropriate. The final thing is that a lack of sleep will go all the way to the top of the business chain. What we found is that the more or less sleep that a business leader has had from one night to the next, to the next, the more or less charismatic that employees will rate that business leader from one day to the next, to the next. Even though the employees themselves, they know they know nothing about the sleep that that CEO has been getting, it's evidential in how charismatic that CEO is. So you can add all of these things up and no wonder if you don't snooze, you lose in the case of business in that regard. That's why I can produce, I think, a non-trivial case for business. By the way, the other aspect that is hugely costly to businesses and when I go and speak to businesses about why they should value sleep, if you offer it on the grounds of, again, sort of compassion or mental health, you probably don't want to listen. When you convert it into the cost of the company and how much it's fleecing them in terms of their profits, then they start to pay attention. Underslept employees will take on average about 11 more days, sick days, throughout the year, relative to well-slept individuals. So you're essentially just paying people additionally for 11 days of work that they will never give you when you are undersleeping them.

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Secondly, the utilization of healthcare resources increases by about 80%. So the cost to either you, the company here in the US where your company is paying for your healthcare, or the cost to the government, for example, in the United Kingdom, is astronomical. And also then what we call comorbid diseases, your rates of obesity, diabetes, cardiovascular disease, mental health conditions, all of these things escalate as underslept employees continue to get even more underslept. So there is no strong case that I've seen that leads me to think businesses should foster the mentality of insufficient sleep, quite the opposite. So that's hopefully an answer to your question. We can look at it bi-directionally. When we give sleep back, do you get productivity? Yes. When you take sleep away, do things implode rapidly? Yes. And is it costly to your company? Very much so. Very much so. On that point of naps, and you know, Google, sleep pods, naps and things like that, there was a point in my life where I, because I learned about REM sleep and the importance of REM sleep and deep sleep, and that happens a little bit further on into my, you know, the 90 minute look at me trying to tell a sleep expert. But do you see what I mean? Like, this is my monkey brain. So I didn't understand the subject matter very well, still really don't, to be honest. But in the first, it takes me a significant amount of time to get to deep sleep into REM sleep. How long on average would you say it takes for it for some, you know? Yeah. So you will probably go into light sleep in the first 10 to 15 minutes, then you'll go down into deep sleep, you'll stay there for about 30, 40 minutes, then you'll start to rise back up, and you'll pop up and you'll have a short REM sleep period. And then you complete the non-REM to REM cycle after about 90 minutes, and back down you go again, down into non-REM and up into REM. So on average for human beings, it's 90 minutes. So I therefore assumed that napping really does nothing, because I thought, well, it takes me so long to get to REM sleep and to deep sleep, that there's, if I've got 15 minutes, 20 minutes to, to nap, it's just a waste of time. Right. Was I wrong or was I right? Right. You were understandably wrong. Okay. Good. I'm happy because I've always rejected naps because I thought they don't matter, because it takes me so long to get to a restorative state anyway. So, we've done lots of different studies with naps. We and other colleagues too. And what we found is that naps can transact some fantastic benefits. They can improve cardiovascular health, lower blood pressure. They can improve your learning and memory abilities. They can reset the emotional north of your magnetic compass in a good way, where you can de-escalate negative emotions and increase positive emotions. So naps certainly are a good thing, but with a big caveat that I'll come back to, yes, you're right in the sense that to get a full cycle of sleep and to get into REM sleep, you would probably have to make that nap about 90 minutes. And in fact, a lot of the studies that we do, we will use a 90-minute nap duration of time so that the brain can cycle through all of those different stages of sleep. But you don't need to, nor would I suggest that you do. What we found is that different stages of sleep perform different functions for the brain at different times of night. There are actually four separate stages, stages one through four, increasing in their depth of sleep. So stages three and four are those really deep stages of non-REM sleep. Stages one and two, that's the lighter form of non-REM. And then you have rapid eye movement sleep or what we think of as dream sleep. And people will sometimes say to me, how do I get more REM sleep? Or how do I get more deep sleep? And my response to them is, why do you want to get more REM sleep? And their answer is, well, isn't that the good stuff?

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And it turns out that there is no good stuff. It's all good stuff. Maybe with the exception of that light stage one non-REM sleep, that shallow sleep when we typically don't like to see too much of that. But stage two non-REM sleep, three and four, they all have their different functions that we've discovered and REM sleep has its functions. So you need all of them. You can't short-change any of them. But for a NAP, what we found is that you can get nice benefits for things like your learning and your memory. And it can even reduce some level of anxiety up to about 20 minutes. You can, in fact, you can NAP. I think the study, one of the studies, one of the studies, they brought a NAP down to about nine minutes in duration. And there was still some basic improvements for your sort of general level of alertness and reaction time. For example, if you're an athlete, that's non-trivial. So the reason I would say be careful with NAPs is for two main sort of suggestions. The first is try not to NAP for about longer than 20 minutes. Because once you go past 20 minutes, you really start to go down into those deeper stages of non-REM sleep. And if you wake up after about 45 minutes or 60 minutes, it's not a problem. I'm not suggesting that you shouldn't or you couldn't. I'm just saying be aware because when you come out of that deep sleep and you wake up from that deep sleep, normally that's not how you wake up. You will usually wake up out of lighter stages of sleep or out of REM sleep. It's rare that we wake up out of deep sleep. But if you NAP and you NAP for about 40 minutes, you'll probably go down into deep sleep. And at that point, if you wake up and your alarm goes off, then you're going to feel almost miserable and worse than you did before the NAP because you have what's called sleep inertia, which is essentially a sleep hangover, where the brain is still sort of pulled back into that deep sleep state. And it can take you almost an hour before you feel like you're back up to operating temperature and you're up to motorway speed. So I would say keep it to 20 minutes and you don't suffer too much of that inertia. You still get some nice benefits. Also don't NAP too late in the afternoon. Also the final part is if you are struggling with sleep at night, if you're someone who has insomnia or sleep difficulties, do not NAP during the day. It's the worst thing that you can be doing because when we're awake during the day, we build up a sleepiness chemical in our brain. It's called adenosine. And the longer that we're awake, the more adenosine that builds up, the more adenosine that builds up, the sleepier and sleepier that we feel. And when we sleep, the brain gets the chance to clear away all of that adenosine, all of that sleepiness. And somewhere between seven to nine hours after sleeping a full night, the brain has evacuated all of that sleepiness chemical, all of that adenosine so that then we should wake up and we should feel refreshed and restored and not needing caffeine to function. Why is that relevant to NAPS? Well, it's relevant to NAPS because when you take a NAP, you're essentially, it's like a pressure valve on a cooker. You're just releasing some of that healthy sleepiness that you've been building up. And therefore, if you are struggling with sleep at night and then you NAP during the day, it's terrible because you're taking away all of that healthy good weight of sleepiness that we've been trying to build up on your shoulders to give you the best chance of a good night of sleep. That's why I would say if you are suffering from insomnia, don't NAP during the day. Also, even if you don't struggle with sleep at night, try not to NAP after about 3 p.m. in the afternoon or 2 p.m. Napping late in the afternoon or in the early evening.



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It's a little bit like snacking before your main meal. It just takes the appetite off your sleep hunger. So try not to do that. But NAPS, for the most part, if you don't struggle with sleep, they are wonderful things. Just keep in mind the 20-minute sort of idea.

You mentioned caffeine there, the topic I've mulled over over and over again on this show. Because as I've said to maybe three or four of my guests now, it feels like caffeine is a miracle drug that comes with no apparent cost. When I think about things like anxiety and shallow sleep states, I've always pondered that maybe caffeine is playing a role in that. You said you're pro-caffeine. You're a caffeine drinker yourself.

So I am not a caffeine drinker myself, but I am pro-coffee.

Oh, okay. And I'll tell you why I'm very thoughtful about my wording between caffeine and coffee there. And to your point, it's another astute one, which is is it a miracle drug with no cost? In biology and medicine, there is almost no free lunch. And that is true when it comes to caffeine and sleep. So perhaps I'll give the skinny on caffeine and how it impacts your sleep, but then circle back around to what seems an oxymoronic statement for me, which is why I'm still pro-coffee. Caffeine will hurt your sleep in probably at least three ways, some of which you most people are not aware of. The first issue is the duration of its action. So caffeine has what we call a half life of about five to six hours. In other words, after about five to six hours, half of that caffeine is still in your system. What that means is that caffeine has a quarter life of somewhere between 10 to 12 hours. So if you have a cup of coffee at noon at midday, a quarter of that caffeine is still in your brain at midnight.

So having a cup of coffee at noon, and it's hyperbole in truth probably, or it's a little bit hyperbolic, but it's almost the equivalent of a coffee at noon is the equivalent of, you know, tucking yourself into bed. And just before you turn the light out, you swig a quarter of a cup of coffee and you hope for a good night of sleep. And it's probably not going to happen. So that's the first thing to keep in mind is the timing of caffeine. The second is that caffeine is a stimulant. Now, everyone knows this, everyone knows that caffeine can make you more alert and more awake. By the way, how does it do that? It comes back to adenosine, which is the chemical that we spoke about, the sleepiness chemical. It's no coincidence that those two things sound the same at the end of the name, caffeine and adenosine. Caffeine will actually race into your brain and it will latch on to the adenosine receptors, the welcome sites in your brain.

And it has very sharp elbows and it will force away the adenosine from those receptors and it will hijack those receptors. Now, at this point, you may be thinking, well, hang on a second, if it's latching onto those sleepiness chemical receptors, shouldn't caffeine make you more sleepy? And the answer is no, because what it does is it just latches onto the receptor and it inactivates it, essentially. So it masks the receptor. What caffeine does then is race into your brain. You've got all of this sleepiness at 9pm or 10pm. You haven't expressed it because you're trying to power through and finish the report or the presentation for your pitch deck, for your startup company. And that caffeine races in, it latches onto the adenosine receptors and blocks the signal of adenosine. So now your brain was thinking, I'm starting to get tired, it's 10pm, but now all of a sudden that signal is blocked. And caffeine is like hitting the mute button on your television remote controller. It just mutes the signal of sleepiness. So now you think, well, no, I don't feel sleepy anymore. And here's the danger that even though, well, when the caffeine is in your system and it's latched onto the receptors, that adenosine is

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still there. It's not going away. In fact, if anything, during the course of the caffeine in your system, it continues to build and build. And now when the caffeine finally gets metabolized and excreted out of your system, not only do you go back to the sleepiness that you had many hours before, it's that plus all of the adenosine sleepiness that's been building up during that time in between. So you get hit with this huge tsunami wave of sleepiness. And that's what we call the caffeine crash. So the one of the issues, so that's sort of caffeine in terms of how it works in its timing. Another issue is that it creates anxiety just as you said. And anxiety is probably one of the greatest enemies of sleep. It's one of the principal reasons that underlies insomnia is a physiological state of anxiety, that your fight or flight branch of the nervous system is ratcheted up. That's what caffeine will do. It needs to do the opposite for you to fall asleep. That's why you can have what we call the tired but wired phenomenon where you say, I'm so desperately tired. I am so tired, but I'm just so wired that I can't fall asleep. It's because your nervous system is too amped up. Caffeine will trigger that amping up. Then at that point, if you're struggling to fall asleep, because you've got too much caffeine on board, it is what we call angziogenic. So now you start to worry. And the last thing you need to do when your head hits the pillow for good sleep is worry. Because when you start to worry, you start to ruminate. And when you ruminate, you catastrophize. And when you catastrophize, you're dead in the water for the next two hours when it comes to sleep. Because we have this sense that things at night, in the darkness of night, are so much bigger than they are in the brightness of day. And we start worrying, you know, in this modern era, we're constantly on reception. And very rarely do we do reflection. Unfortunately, the only time when we typically do a reflection is when we turn off the light and our head hits the pillow. And that is the last time you want to be doing reflection. So that's the second problem with caffeine. It's angziogenic. It only makes you sort of almost like the Woody Allen neurotic of the sleep world. The final part of caffeine is that it's very good at blocking your deep sleep. So we've done a number of these studies where we'll give people a standard dose of caffeine, let's say 150 milligrams 200 milligrams, which is probably, you know, a cup and a half of good strong coffee. And then we put you to bed and we look at the amount of deep sleep. And it will strip away your deep sleep by about somewhere between 15 to 30%. Now, to put that in context, to drop your deep sleep by 30%, I'd probably have to age you by about 40 years for zero. Or you could do it every night with an espresso with dinner. And that's one of the problems that people will say to me, look, I'm one of those people who I can have two espressos with dinner, and I fall asleep fine, and I stay asleep. So no harm, no foul. Well, not necessarily, because even if you fall asleep and you stay asleep, you're not aware of the lack of the deep sleep that you're not getting because of the caffeine. And so now you wake up the next day and you think, well, I don't remember having a hard time falling asleep. I don't remember waking up. But now I'm reaching for two or three cups of coffee the next morning, rather than my standard one cup of coffee, because I don't feel refreshed and restored by my sleep, because I was lacking the amount of deep sleep. And deep sleep, what does that rub us of the lack of deep sleep? So lack of deep sleep, deep sleep is critical for regulating your cardiovascular system. It's the time when we do replenish the immune system. It also regulates your metabolic system. So it controls the hormones such as insulin that will regulate your blood sugar and you will become blood sugar dysregulated without sufficient deep sleep. Upstairs in the brain, deep sleep

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will strengthen and consolidate and secure new memories into your brain. They will prevent those memories from being forgotten. Deep sleep is also the time when we cleanse the brain of metabolic toxins, particularly the toxins that are related to Alzheimer's disease.

So getting a lack of deep sleep is I would say a non trivial thing in that regard.

But I don't want to be also puritanical here. And this is where I'm going to change my title, tune. I am not here to tell anyone how to live their life. I have no right to tell anyone how to live their life. I'm just a scientist. All I want to try and do is gift you the science and the knowledge of sleep so that you can make an informed choice. And after all, and the same is true for alcohol too and sleep, you know, life is to be lived to a certain degree. You know, no one wants to be the healthiest guy in the graveyard. I don't want to be that way too.

I want to live life just with moderation. The reason I don't drink caffeine is not because I'm so puritanical. I want to be the poster child of good sleep. I love the smell of freshly ground coffee in the morning. And it's a great ritual. It's just that I've written my genetics and I am one of the slow caffeine metabolizers. So you can do these genetic kits online and they will tell you, are you a slow metabolizer or a fast metabolizer? So that's the variability. That's why some people say like, I'm pretty immune to caffeine and others will say no. Why do I now favor coffee? I was actually quite anti-caffeine in coffee when I first came out with the book, just looking at the studies. But now the data is immensely compelling. The health benefits associated with coffee are undeniable, study after study after study. And we can put them all together in this big, what we call a meta-analysis study. And it is so strikingly clear that coffee, drinking coffee is a good thing for you from a health perspective.

Two things to say about that. The first is that it's got nothing to do with the caffeine.

And a lot of people have sort of rightly challenged me to say, look, you say how problematic sleep can be when you're drinking too much caffeine. But yet coffee is associated with many of the same health benefits that sleep is associated with. But coffee is supposed to hurt your sleep.

How do you reconcile those two, Matt Walker? And the answer is very simple, antioxidants.

Anti-oxidants. Because it turns out that the coffee bean contains a whopping dose of anti-oxidants.

Things such as, it's what's got other things such as kaffa style, but it's got a bunch of incredible anti-oxidants. Probably the most powerful of them in terms of the coffee bean is something called chlorogenic acid. Now don't worry, it's not chlorine, it's not chloride,

it's not bleach. Chlorogenic acid is very different. And what's happened in the modern world is that we have and struggle with our diet so much because we don't eat enough, whole foods, etc.

So what's happened is that the coffee bean has been now asked to carry the herculean weight of all of our antioxidant needs on its shoulders. And where most people get the majority of their antioxidants is by way of drinking coffee. That's why coffee is associated with so many health benefits and it's not the caffeine. Case in point, if you look at the studies with decaffeinated coffee, you get very similar health benefits. Again, it's not the caffeine, it's the coffee itself.

So the bottom line here is drink coffee, but I would say the dose and the timing make the poison.

So try to limit yourself to about two cups of coffee, three cups of coffee maximum,

because if you look at the health benefits, by the way, it's a dose, it's not a dose response where it's linear, where the more and more coffee you drink, the more and more healthy you become.

It peaks at about two to three and then actually starts to go down in the opposite

direction.

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direction for lots of reasons that we can speak about. So dose and the timing make the poison when it comes to coffee. So you drink decaf. So I do drink decaf. So I will drink coffee just because I love the smell and I do enjoy the taste of it, but I drink decaffeinated coffee. I would love to drink caffeinated coffee too, because I'm sure it would be interesting because I work out every day and I work out every morning and so many of the health coaches that I speak with and health professionals say, you know, you should definitely get a shot of caffeine and it boosts your workout. And actually the data on that is pretty clear too, that you're lifting, for example, in the gym and your metabolic activity is stronger when you've had pre-caffeine doses. But it's also stronger when you sleep.

But exactly. And that's the problem. And sleep is, I would argue, much more beneficial to health. And if you're trying to work out or you're trying to be an athlete or perform, sleep will trump caffeine five ways till Tuesday. I mean, sleep is probably the very best legal performance enhancing drug that we know of that not enough athletes are abusing. As you might know, the show's now sponsored by Airbnb. I can't count how many times Airbnbs have saved me when I'm traveling around the world. Whether it's, you know, recently when I went to the jungle in Bali or whether it's when I'm staying here in the UK or going to business in America. But I can also think of so many times where I've stayed in a host's place on Airbnb. And I've been sat there wondering, could my place be an Airbnb as well? And if it could be, how much could I earn? It turns out you could be sitting on an Airbnb goldmine without even knowing about it. Maybe you have a spare room in your house that friends stay from time to time. You could Airbnb that space and make a significant amount of money instead of letting it stay empty. That in-law, that guest house, that annex where your parents sometimes stay, you could Airbnb that and make some extra income for yourself. Whether you could just use some extra money to cover some bills or for something a little bit more fun, your home might be worth a little bit more than you think. And you can find out the answer to that question by going to [Airbnb.co.uk slash host](https://www.airbnb.co.uk/hosts). One of the other sort of ongoing stereotypes that I've always wondered if it was wrong or right or whatever. Now I get a chance to ask you is about this culture of sleep medication. So I've got some friends who might have, I don't know, prescribed sleep medication, but I've got a lot of friends also that use what they call sort of natural, they always use the word natural, natural something. So it's like natural sleep tablets. What's your perspective on this culture of humans taking sleep tablets to get them to feel sleepy and go off to sleep at night?

Usually when people ask me that question, personally, the first thing I ask them is, why is it that you think you're not able to sleep? And try to reverse engineer the question from there before we even start thinking about sticking band-aids on wounds. I firstly want to ask what's causing the infection, because we can keep bandaging it for all we like. But if it keeps festering, it's probably not going to go away anytime soon. Is there a problem to keep bandaging it? It is a problem. Right now, we don't typically advocate sleeping pills as the first line defense agent against or for insomnia as a treatment. In fact, in 2016, the American college, and again, this is me simply describing the science. This is me being descriptive of the science, not prescriptive in terms of medicine, because I'm not a medical doctor. But in 2016, the American College of Physicians, they had an expert panel who surveyed all of the literature on classic sleeping pills. And what they suggested was

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that sleeping pills must no longer be the first line treatment for insomnia. It has to be cognitive behavioral therapy for insomnia, or what we call CBTI, which is a psychological intervention that we can speak about. But their recommendation was that they found, I think their wording was small and of questionable clinical importance in terms of the benefits of sleeping pills.

Now, there is a time and a place in clinical medicine for sleeping pills, but usually as an adjunct in combination with cognitive behavioral therapy, they are not advocated for long term use. So they're usually advocated for short term use weeks. Most people have been on them for months, if not years, these classic sleeping pills. And that's a problem because those sleeping pills are in a class of drugs that we call the sedative hypnotics. And sedation is not sleep.

For some subset of some people, there are some of these quote unquote sleep supplements that may benefit, but overall, the studies are very clear. None of them are efficacious. And when you think about it, it makes sense. If there was some cheap sleep supplement that you could buy on Amazon, that was the Shangri-La of good sleep. That was this miracle sleep drug. Don't you think that a pharmaceutical company would have patented it 20 years ago and be making billions of dollars

from it? That alone tells you all that you need to know about these natural sleep supplements.

Cognitive behavioral therapy for insomnia, though, seems to be the front line of prescribed defense against a lack of sleep in insomnia conditions. What exactly is that therapy aiming to do? What does it do for somebody? Great question. So in some ways, the title tries to suggest what it does, but not particularly well, perhaps. So it focuses on cognitive aspects and it focuses on behavioral aspects. So for the cognitive aspects, when we do cognitive behavioral therapy working with the patient, we'll try to focus on thoughts and beliefs and ideas around sleep. Do they have anxiety around the bedroom? Most of them do. I can't sleep because I can't sleep. So every time I walk into the bedroom, my bed is the enemy and I look at the bedroom and I look at the bed and I just know that that means I'm going to have a bad night of sleep.

So what's happened is that at that point, your sleep controls you and you've lost all confidence in your ability to sleep and we need to course correct that. So one of the things we do in cognitive behavioral therapy is that we lower that anxiety and we say, look, everyone has a bad night of sleep, even a bad couple of nights of sleep. In fact, I will tell you, I don't sleep perfectly well all the time too. I've had at least two very severe bouts of insomnia in my life.

We all have a bad night of sleep. It doesn't mean that tomorrow you're going to wake up with depression or Alzheimer's disease. Don't worry, you're not going to get cancer, you know, just because you've had a bad night of sleep. So we start to change people's misbeliefs about sleep and we try to get them back from being catastrophic about this idea of my not sleeping.

So that's the cognitive aspect. We start to lower their anxiety around the bed and the bedroom. We start to try to build confidence back. We start to reduce their expectations about, you know, what is reasonable sleep? Well, right now you're getting four or five hours of sleep and we can do better. But don't start thinking that you need to get eight hours of sleep straight out the box. Let's just manage it. That's just because it's going to stress you out, right? It's only going to make matters worse. Right, okay. You know, when you're struggling with sleep in the middle of the night and you're wide awake, you're laying in bed and you're thinking, oh my God, I've got five hours left before I've got to go to work. It's the last,



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you know, it's a little bit like trying to remember someone's name. The harder you try, the further you push it away. So would you say, and that's what do I do in that situation? It's two a.m. in the morning, you've got to be up at seven, there's a flight you're getting on, so whatever. What should one do? Because from what I was reading in chapter 14, I was hearing that maybe I should get out of bed or not just sit there and ruminate into the early hours of the morning. Or do I stay in bed and do something? What does one do? The prototypical recommendation is that after about 30 minutes of time awake, you should get out of your bed and you should just go to a different room and do something like, you know, read a book or listen to a podcast. Don't eat because it then trains your brain to wake up to do that. Don't start working or getting in front of a computer screen, you know. I said, listen to a podcast. Sure, you know, just make sure your phone's in, you know, you don't start scrolling anymore than that, but you can do relaxing things, stretch, meditate. The reason is because if you start to spend a lot of time awake in your bed, your brain is an incredibly associative device. And very quickly, it will start to learn that this thing called your bed is this place where I'm always awake. And therefore, you start to learn through this repeated loop of behavior that I'm always going to be wide awake in bed and we need to break that association. And that's why we say get out of bed after about 30 minutes because you're just training your brain to think that this thing called my bed is the place where I'm never asleep and we want to break that and only return to bed when you're sleepy. And there's no time limit for that. And that way, gradually, it's much better because you will relearn the association that your bed, just as when you were young, was guaranteed that your bed is this place where you will always be asleep. The problem with that is many people don't want to, you know, it's the middle of the night, it's dark, it's cold. I'm not, I'm just not going to get out of bed. So what's your other, what else have you gotten your toolbox, Matt? At that point, I would say, okay, that's reasonable. The first thing I would suggest is meditation. You know, I am a hard no scientist. And when I was researching that the book, I was, you know, I just thought this sounds all a bit woo woo and you know, I live and work in Berkeley, California, which is kind of, you know, the free speech, you know, flower power movement, San Francisco, flowers and you have business. I just thought this is all a bit, you know, holding hands and singing come by our eyes. This is not for me, this, this meditation stuff. I couldn't get away from the strength of the data. It was immensely powerful regarding sleep and its benefits on insomnia and sleep. So I started meditating. And now I meditate for 10 minutes before bed every single night. I've been doing that for about four years. So I would say, if, even if it's in the middle of the night, and if I wake up in the middle of the night, I'll start to try to walk myself through a meditation. You referenced that listening to podcasts, etc. etc. You know, doing something else to stimulate the brain. I, when I go to bed, I have to have something playing. I say have to, I shouldn't be that definitive. I like to have something playing some kind of sound or noise, whatever. And much to my partner's dismay, my content of preference is serial killer podcasts or documentaries or just like something which is really going to grab hold of my brain and focus me. So something like, it has to be really interesting to me for me to be able to

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focus on it. My partner is the opposite again. She likes silence. Why do I listen to serial killers? It's different for different people's constitutions. Yeah. Yeah. And psychologies. And, you know, I can pathologize you all you like if you would wish me to. But I would say it, what's fundamentally going on here with meditation? And I'll come back to an alternative too. But the reason why some meditation apps as well have now started to do what's called sleep stories, which in some ways is what you're doing a version of with your podcast, is harks back to when we were kids. You know, for many parents, they would just read a book to their kid, you know, the children's books, good night books, because you would read the child to sleep. And for some reason, we as we developed into adults, we thought, well, we no longer benefit

from having a story read to us to help us sleep. No, it's not true. We benefit hugely. In fact, the the meditation company calm, you know, was saved by the introduction of sleep stories into their app, they were doing pretty well as a meditation app. But then they started to do sleep stories. And it became a unicorn company, in terms of its valuation, broke a billion dollars. And it was on the back of sleep stories. And what they realized is that people were self medicating their insomnia by way of meditation. So they latched onto that. And then they found that these stories sleep stories were great. And you've got now wonderful people, people who you've interviewed on the show. So what you're doing and what those sleep stories are doing, and what meditation is doing, it's all the same thing, which is that it is taking your mind off itself. Because when you are struggling to sleep, or you've woken up in the middle of the night, what you don't want to be doing is focusing on either what you, what you, what did I do today? What did I not do today? What did I do poorly? Oh, my goodness, what have I still got to do tomorrow? And at that point, things are just a disaster, you're wide awake. What all of the things that we've just discussed do is they take your mind off itself. And at that point, then you start to allow sleep to come back naturally. That's why one of the other suggestions is take yourself for a mental walk. So don't count sheep, by the way, that doesn't work. A colleague of mine at UC Berkeley did the study actually takes you longer to fall asleep if you're counting sheep. What she found Dr. Alison Harvey was that if you just close your eyes and you think about a walk that you take frequently, let's say it's a walk with the dog, and you think about it in high fidelity detail. So I close my eyes, I go out the door, take a left down the steps, then I'm going to go up the street, I take the first left, pass that pine tree. That's the level of detail. If you just walk yourself on that mental walk, sure enough, people fall asleep in about 50% less time, half the time it takes.

This is the thing with sleep stories and also my serial killer documentaries or serial killer podcasts that I listen to, detail. Exactly. You get, even I've listened to calm sleep stories before and the attention to detail in the sort of descriptive nature of what they're saying is so apparent. They'll say things like the cold, wet windowsill saw the raindrops like tapping against it one by one by one by one. And that sounds very similar to my serial killer documentaries when I hear about the serial killer coming in through the window. Yeah. At night time. And I wondered why the descriptive nature of it, the detail matters for dozing us off. And because it prevents, I mean, you've got limited bandwidth in terms of cognitive capacity. Right. And if you're consumed and you saturate your bandwidth with that level of detail, it's very hard for any of these other things called our worries

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and our anxieties to start entering into our mind. The other thing I would note, by the way, though, is if you are, if none of these things are working for you, if the fictional notion of serial killing is not working for you, if meditation is not working for you, if going on a mental walk is not working for you. This is the final suggestion I have. If you're lying there awake, firstly, by the way, if you're struggling with sleep, remove all clock faces from your bedroom. It's one of the best pieces of advice I can give you. Knowing what time of night it is is no favor. So knowing now that it's 3.23 a.m. in the morning and I'm still struggling to fall asleep, and then I look back at the clock and it's now 4.03 a.m. and I've still been awake and now it's 4.27 and I've got to wake up at 6.30 a.m. Knowing that has no utility for you. Remove all clock faces from your bedroom. It is a gift. But coming back to the final suggestion, if you don't want to get out of bed, if you don't want to listen to a podcast, the final thing I would say is just accept and say, look, it's okay. Tonight is not my night. It is not the worst thing in the world. And instead of trying to sleep, all I'm going to do here is lie in bed and I'm just going to rest. Because wouldn't it be lovely if someone came to you in the middle of your work day? You're just stressed and someone says, by the way, just come into this room. There's a bed here. Just lie down and just rest for an hour. Wouldn't it be lovely? Just have a good old rest for an hour. Just rest there. And I would say that if you can't sleep, just lie in bed. Stop worrying about sleep and not being able to get it. Stop worrying about the next day. Just lie in there and enjoy a nice good old rest. And by the way, usually what happens is that after you start thinking, okay, I'm going to rest, the next thing you remember is the alarm clock going off at 6.30 because finally you stopped trying and sleep happened. So yeah. Of course. You know, prolonged, one of the things I've also, I wonder if this is a, if I'm wrong about this, is I sometimes thought that, you know, I could go Monday to Friday and kind of sacrifice my sleep. This was specifically when I was really in the height of like running big businesses, et cetera. And then on the weekend, I'll just make up for it. So I thought, you know, I could go Monday to Friday, I'll sleep maybe sometimes two hours a night, three hours a night, whatever. Then Saturday, you know, I'll just do a, you know, 11 hour sleep and I'll just make up for it. Yeah. Is that a good strategy? The delightful laughter at the end of your sentence that I think probably tells you the answer that, you know, unfortunately, sleep doesn't work like that. It would be nice if it did. Sleep is not like the bank. In other words, you can't accumulate a debt as you were doing during the week and then hope to try and pay it off at the weekend. So for example, let me take an extreme version of that experiment. Let me take you tonight. I'm going to deprive you of sleep for an entire night for, let's say, eight hours of sleep. And then tomorrow night, I'm going to give you all of the recovery sleep that you want as much as you wish for. And then the next night, you can have all of the recovery sleep that you want. And even on the third night, will you sleep longer than that first recovery night after a night of no sleep? Absolutely, you will sleep longer. But across those three or four recovery nights of sleep, will you get back all of the sleep that you lost? Not even close. You'll maybe only sleep back about four, four and a half of the eight hours that you lost. In other words, by that stage, you are four or three and a half hours in overdraft on your sleep bank account. You went into debt and you only paid about 50% of it back. So what's happening with you during the week is that you're accumulating this debt, you know, of maybe 10 hours, you're short changing, you're only sleeping like six hours a night for the five nights during the week.

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And then you binge on sleep and you try to maybe sleep 10 hours or 11 hours. That's only two or three extra hours. So some total, that's only four to six, you know, hours of made up sleep relative to the 10 hours of debt. So what happens is that that next week, you now carry forward four hours of your debt. And then next weekend, you try to sleep it back, but you're still four hours lost. So now you've got eight hours of net debt. In other words, what it develops is into a compounding interest on a loan. It just starts to escalate ballistically across weeks, across years and across a lifespan. And then what happens in terms of health outcomes? So say that I did that for a couple of years, say that I sustained that pattern of, you know, depriving myself of sleep throughout the week, maybe catch up on Saturday, depriving myself again the next week, catch up on Sunday, deprive myself the next week. And I did that pattern for the multiple years. What would be the health implications?

So you can describe them short, mid and long-term. The first thing I would say, though, is that the elastic band of sleep deprivation will stretch only so far before it snaps. The short-term, you know, probably the most immediate short-term consequence is that you are popped out in a driving-related accident, drowsy-related accident, because drowsy-related accidents are non-trivial. They make up a large proportion of accidents on our streets in terms of human, errorful driving. When you say popped out? Out of the gene pool. So what happens is that when you are underslept, you're at the wheel and you start to have what we call microsleeps, where your eyelid will partially close. Now, you are not aware of it. You have no awareness of it whatsoever. And in fact, parts of your brain seem as though they're almost falling asleep. Like you're having this microsleep and it lasts for about a second or two seconds. Now, if you're on the motorway and you're traveling at 70 miles an hour and you have a two-second microsleep, that's enough time for you to drift from one lane into the next. If you're just on a two-lane, you know, sort of backstreet, where there's oncoming traffic in the other direction and you're traveling at 40 miles an hour and you drift half the way into that lane, that's oncoming traffic. So in other words, if you have a microsleep at 60 or 70 miles an hour, at that point, there's a two-ton missile traveling at 60 miles an hour and no one's in control. And that may be the last microsleep that you ever have in your life. Obviously, all the other things you've mentioned would be implications, things like performance drop, sort of memory, relationships, libido would all drop off. So I wouldn't be having as much sex. I would, all those things. And midterm.

So midterm, then you're going to escalate those things into more disease states. So for example, if I were to take an individual and people have done these studies, not we, but where you limit them to let's say four or five hours of sleep for one week, your levels of blood sugar are disrupted so significantly that your doctor at the end of that one week would classify as being pre-diabetic. So that's, you could almost argue that short term, not midterm.

You know, one, if you're a male and I limit you to four or five hours of sleep, healthy young male for one week, I will drop your levels of testosterone to that of someone who is 10 years older than you. So I can age you by a decade just by short sleeping you for one week. We see equivalent impairments in female reproductive health in estrogen, luteinizing hormone and follicle stimulating hormone. So it's both men and women. Your blood pressure will start to creep up, your systolic blood pressure in particular will creep up your heart rate in terms of its contraction rate. In other words, the speed of your heart starts to increase. The progression into obesity, diabetes, cardiovascular disease, mental health issues, anxiety, depression,

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suicidality, all of these things, immune compromise, infection, all of those things can be termed, you know, will be midterm. Now all of those things have a longer term tail to them, which is this thing called premature mortality. So using that sweet spot of seven to nine hours of sleep, you can argue that there's a simple truth on the basis of the data, the shorter your sleep, the shorter your life, that short sleep will predict all cause mortality.

Is that supported by data? That's supported by data. Now there's an interesting change there, which is once you get past about nine or 10 hours, your mortality risk doesn't just keep going down and down, it will hook back up again, as if almost too much sleep is a bad thing. And we can explain why that is the case as well and why it's probably not quite as simple as that. But the final long-term consequence that I would say is Alzheimer's disease. Now the two most feared

diseases in developed nations are cancer and Alzheimer's disease. Both of them have links to insufficient sleep, many of them causal. And this relationship between sleep and Alzheimer's disease, this is where we actually do, I'd probably say almost 50% of the work that I do at my sleep center is focused on sleep and Alzheimer's disease. And there the data is stunning. I would say at this stage, insufficient sleep seems to be one of the more or one of the most significant lifestyle factors that can develop or dictate the development of Alzheimer's disease later in life. Now that's a lifestyle factor. There are other genetic factors, but certainly we now know that it's not just that insufficient sleep predicts a greater amount of Alzheimer's pathology in your brain. So for example, people who on average are sleeping six hours or less have a far higher magnitude of beta amyloid, which is the sticky toxic protein related to Alzheimer's disease.

And another protein called tau protein, these are the two protein culprits of Alzheimer's. Both of those are escalate the less and less sleep that you have. Now that's just associational. We also know by the way that two sleep disorders insomnia and sleep apnea, heavy snoring, both of those are associated with a marked increased risk of Alzheimer's disease, of Alzheimer's disease later in life. That's simply associational. That doesn't prove causality, but we now have the causal evidence, both in animal models and in human models. If I deprive a human being of sleep for a single night, or I just deprive you of deep sleep for a single night, the next day we can see an immediate increase in these Alzheimer's disease related proteins circulating in your bloodstream, circulating in what we call a cerebrospinal fluid that bathes the brain and using special brain scans, we can even measure it within the brain itself.

So these are causal manipulations. It's not associational. I manipulate this thing called sleep. And the consequence is that I manipulate your Alzheimer's disease proteins.

That's correlation going to causation. Then the question is, well, mechanism, what is it about sleep when you get it that is de-escalating Alzheimer's disease risk?

In other words, when you don't get it, why would it increase your Alzheimer's risk? And this is a stunning discovery made by a scientist called Macon Nedegaard at the University of Rochester here in America. And she found three things. First, studying mice and rats. She found that the brain has a cleansing system. Now, we didn't used to think that your brain had a cleansing system.

Your body had one and everyone knows what it's called. It's called the lymphatic system.

We didn't think the brain had one, but she discovered that the brain has one. It's called the glimphatic system named after these glial cells that make it up. The second thing that she



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discovered is that that cleansing system within the brain is not always switched on in high flow volume across the 24-hour period. It was expressly during sleep and particularly during deep non-rem sleep when that sort of sewage system was put into overdrive and washed away all of this detritus that built up during the day. And the final thing that she discovered, and this is why it's related to Alzheimer's disease, is that two of the metabolic byproducts that build up during the day in our brain are beta amyloid and tau protein, the two bad actors in Alzheimer's disease. So in other words, what she discovered is a system of good night sleep clean. That sleep is a power cleanse for the brain. And if you're not getting your sleep every night, it doesn't mean that you're going to get Alzheimer's disease next week. It doesn't mean that you're going to get Alzheimer's disease in a year's time. But night after night, once again, it's like compounding interest on a loan. And that's why we now believe through this causal mechanism that insufficient sleep is a risk factor for Alzheimer's disease. Lots of people will say to me, look, there are these individuals in society who claim that they didn't need very much sleep, who didn't sleep a lot. Margaret Thatcher has often quoted to me about that. You know, Ronald Reagan was apparently another short sleeper. I don't think it's coincidental that both Thatcher and Reagan went on to die of the unfortunate disease of Alzheimer's. I'm sold. Sleep is important. I get it. I'm sold. How do I, my question is, what are the things that in the modern society are standing in the way of sleep? We've touched on some of them loosely, but some of the like big obvious things, the things that you would suggest doing very actionable things we could do straight away to improve our chances of having that healthy, deep sleep that we need to be optimal in every regard of our health and performance.

There's probably, I think, five standard tips, what we call sort of sleep hygiene that you can do. And then I'll come on to maybe just some unconventional tips that we've sort of touched on. And we've spoken about many of these. The first thing I would recommend people to do, and this is why when some people say, what about this new sleep supplement or, you know, it's 40 quid for this bottle of these sleeper, new sleep natural medications. I'm going to give it a try. I would say, try these tried and true things first before you spend your money on supplements. The first thing is regularity. Go to bed at the same time and wake up at the same time, no matter whether it's the weekday or the weekend, your brain expects regularity. It thrives best under conditions of regularity. When you give it regularity, you can improve the quantity and the quantity of your sleep. The second thing is get some darkness at night. As I said, we don't get enough darkness in the modern world. And so the trick I would offer, and I don't use it, I don't like the word hack, but the suggestion would be, in the last hour before bed, try this experiment for everyone listening for the next week, dim down half of the lights or switch off half of the lights or even three quarters of the lights in your home in the last hour before bed. All of the lights in every room. In all of the rooms, switch off almost all of the light. Now, I'm not suggesting be unsafe and walk around in the darkness in the last hour. That's not what I'm saying. Just dim down, switch off half of the lights. You will be surprised at how sleepy that darkness will make you feel. And it's also an incredible behavioral trigger to signal to your brain that it is time for sleep, that darkness is around me. That's the second tip is darkness. The third tip is temperature. Most people sleep in an ambient bedroom temperature that is too high. And you need to aim for a bedroom temperature of a bed temperature of about 18, 18 and a half degrees Celsius around about 65 to 68 degrees Fahrenheit,

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if I'm probably butchering the mathematics there on that. But you need to get cool. Now, you can worth it socks. You can have a hot water bottle. That's fine. But the ambient needs to be cold because you need to drop your core body temperature and your brain temperature by about one degree Celsius to fall asleep and stay asleep. And it's the reason that you will always find it easier to fall asleep in a room that's too cold than too hot. So make your bedroom cold, make it dark like a cave. The fourth question would be sort of what we've or fourth suggestion would be walk it out. And we've spoken about this, the 30 minute rule, you know, get up, do something different or meditate, you know, don't lie in bed awake for too long. Then the final two things we've spoken about, well, we spoke about caffeine. We haven't spoken about alcohol, but let me just say as the kind of headline of it. Alcohol is not a sleep aid. Many people use it as a sleep aid. It is not your friend. Alcohol again is a sedative. So it knocks you out. The second is that it fragments your sleep. So you wake up, your sleep is littered with all of these small awakenings. Most of them you don't remember because there's two brief, but it makes for miserable, lousy quality sleep. The final thing is that alcohol is very good at blocking your REM sleep or your dream sleep, which we know is critical for many other functions as well. So alcohol is not your friend. That's the sort of the final tip. Again, you know, just every if you're with friends, have a glass of red wine, just know, okay, my sleep is not going to be great. Thank you, Matt. Yeah, I'm joking. Yeah. It's just, you know, live life too. Of course, yeah. I'm not saying that. I was I was thinking there about the other sort of behavioral things that we do that harm our sleep as well. We talked about coffee earlier on, avoiding that. It's weird that people drink it after dessert in the evening. So I never understood that, because that's an old tradition. But the other thing obviously that the modern generation are even more susceptible to is to have a quick TikTok, look at the social media account or something. Now, I thought, you know, there's a lot of different products out there that are trying to help with the light that comes from these screens that I think is the cause of what's keeping us awake. But there's this little button called dark mode on my iPad. Oh, there's also one called night shift. So if I just pop that on, Bob's your uncle, and I can crack on with my screen time. True or false? Partly true. Oh, good. Okay. So I can just pop that on night mode and dark mode, and then I can carry on using my iPad. Partly true. So it turns out that the blue light from screens does have an impact on sleep. So there's a great study done by Harvard Medical School by some colleagues there. And they showed that reading for an hour on an iPad just before bed, relative to just reading a book in dim light. Firstly, it delayed the time with which people fell asleep. So it took them a lot longer to fall asleep. Second, it reduced the total amount of sleep that they had. Third, it decreased a sleep related hormone called melatonin. It delayed the release of that melatonin, and it reduced the amount of melatonin. And finally, it reduced the amount of rapid eye movement sleep. So it had significantly significant the melatonin point. Yeah, significantly. So it delayed the release by about somewhere between 90 minutes to two hours across the individuals. So in other words, your brain wasn't so what melatonin does, it's a it's called the hormone of darkness or the vampire hormone, just because not because it makes you want to bite into people's necks, because it signals to your brain that it's nighttime, that it's darkness. And so your brain needs the signal of melatonin for it to understand when is it dark.

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In other words, it needs to understand by way of melatonin when it is time to fall asleep. And when you're bathed in electric light at night, and especially when you're getting blue light from these devices, your brain is fooled into thinking it's still daytime. And when there is light emitting through your retina coming into your brain, it signals to a part of your brain to hit the brakes on melatonin. And your brain will not release melatonin. So what was happening with this iPad reading is that you were artificially telling the brain it's still daytime, and the brakes on melatonin was still shut on. And so melatonin was not starting to be released until much later. And what was also interesting about the study, by the way, is that when they stopped the iPad reading, the sleep disrupted pattern continued for several days later. In other words, it was almost like a drug that it had a washout period that was a blast radius to it. Now, there's been some great work by a wonderful sleep scientist in Australia, Michael Gradisar. And he has added to this story. And he said, it's not just the blue light. These devices, the principal function of these devices is that they are attention capture devices, just like you said, I'm just going to have a wee little tick tock before bed. They are in the attention economy. And all they care about is capturing your attention for current currency. And they make a lot of money from it. What that attention does is that it stimulates your brain. And when your brain is stimulated, it's very difficult for you to fall asleep. And it creates what we call sleep procrastination, where you're lying in bed, and you could be perfectly sleepy, and you could fall asleep right now. But then you sort of check social media and they think, oh, I'll just shoot that last email, and then I'll order that last thing on sort of, you know, Amazon. And then you get a text back from your friend and you start texting them. And then you look up and it's now an hour later, and you're an hour deficient on sleep. So it's the activation of your cerebral cortex by these devices, that is perhaps the more harmful aspect of them regarding your sleep. Now, here again, I don't want to be finger wagging, you know, the genie of technology is out the bottle. And it's not going back in any time soon. There's nothing that I'm going to say as a sleep researcher that's going to change that. I don't take my phone into my bedroom. I put my phone out in the kitchen. I don't see it until morning. But lots of people do and fair enough. But there's another rule that I've stolen from another friend called Michael Grandner, who's here in America at the University of Tucson in Arizona. He has this great rule regarding technology. And it's the following that if you really must take your phone into your bedroom, you can only use it standing up. And what you'll find is that after about six or seven minutes standing up, you think, I'm just going to sit down on the bed. And at that point, as soon as your backside hits the bed, you're done, you've got to put the phone away. I think it's a great rule of thumb if you need to take technology in the bedroom. I'm going to apply that. The other thing I wanted to ask was about sleep and weight loss. I've had a lot of health experts on this podcast recently, but none of them have really talked to me about the role that sleep or sleep deprivation plays in weight. Is there a relationship? It's probably one of the most well-defined relationships that we know in all of sleep science. And it is at least a three-part story. So the first emerging evidence came in terms of hormones. So there are what we call appetite-regulating hormones, and the two principal ones of concern here are something called leptin and ghrelin. Now, leptin, when it's released, will signal to your brain that you're satisfied with your food, you are satiated, and you are no longer hungry. Ghrelin does the opposite. When ghrelin is released, it says, no, you're not satisfied with your food, you are not full, you still want to eat more,

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you are still hungry. And some of the first studies, they started to just limit people, restrict people's sleep to six hours or five hours or four hours. And what they found was that there was, firstly, that signal leptin that says, no, you're satisfied with your food, you don't want to eat anymore, you're full. That signal of fullness, satiation, was decreased by 18%. If that wasn't bad enough, ghrelin, which is the hunger hormone, that leptin up by 28%. Overall hunger levels rose by about 26%. So firstly, it's almost like double jeopardy, that you are getting punished twice for the same crime of not sleeping enough, once by losing the signal of, I'm full, I don't want to eat anymore, and once again for the, no, I'm much more hungry, and I'm just going to overeat, which is ghrelin. So what that produces is a profile of increased eating. So on average, under slept individuals started to eat in those studies, about three to 400 extra calories at each sitting by way of insufficient sleep. Then what they discovered is that it's not just that you want to eat more, it's what it is that you have a craving for when you are under slept. And this is the problem. What they found is that when you are under slept, you eat more of everything, but you especially eat more of these heavy hitting stodgy carbohydrates, bread, pasta, pizza. The next thing that you started to eat, have a preference for was simple sugary foods, sweets, and chocolate. And then finally you started to crave very salty food, and high sodium food intake will increase your blood pressure. So that was the first of the three mechanisms. Then we did a study where we said, perhaps it's not just the circulating hormones in the body, the brain is the ultimate arbiter of your food decisions. So what's going on in the brain? So we took a group of perfectly healthy individuals, and we put them through the experiment twice, once when they'd had a full eight hours of sleep, and once when we deprived them of sleep. And the next day we placed them inside an MRI scanner, and we showed them images of lots of different foods that range from being sort of, you know, very healthy to being very unhealthy and sort of ice cream and, you know, chocolate and pizza and things to leafy salads and nuts and greens and vegetables. And we asked them to rate how much they wanted that food for each item. Now we did something a bit sort of dastardly, to make it more ecologically correct so that they weren't just saying, okay, they probably think I should probably say that's healthy. We said, we're going to randomly select one of these images, these food images that you see, and after you get out the brain scanner, we're going to give you that food and we're going to politely ask you to eat it all. So it made it a bit more realistic so the choices were more, you know, as much as that we could. So what we found is that when they were sleep deprived, the deep, hedonic centers, the emotional centers of the brain, these desire centers, these reward centers, they ramped up in their activity in response to these highly desirable, highly unhealthy foods. So these more basic sort of, you know, guttural parts of the brain as it were, these reward centers were lighting up much more strongly when you were sleep deprived. Worse still, the impulse control regions in the front of the brain, what we call the prefrontal cortex, they were shut down, they were taken offline. So as a consequence, you lost your impulse control. And that's why you start to then say, you know, when I'm sleep deprived, at the food sort of buffet, I'm not going to do salad, I'm just going to, that pizza looks awful good or that pasta with the cream, I'm just going to go into that all go. So, so you're, it's what we call a pattern in terms of brain activity in neuroscience of hedonic eating, that your brain goes into this hedonic desire profile. So now we understood it's not just

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hormones in the body, it's also changes in the brain, then came the finding that there's another chemical in the body that's responsible. And this comes on to cannabis. When people, when people, when people that you may know, have smoked cannabis, they'll often say, I get viciously hungry, I get the munchies, I get really hungry. That's no coincidence because cannabis will stimulate appetite. Now we all have naturally occurring cannabis compounds in our brain and our bodies. They are called endocannabinoids. Endo meaning comes from insiders, whereas the cannabis that comes externally when you sort of smoke it or take edibles. So endocannabinoids do many things for the brain and the body, but one of the things that they do is control your appetite and your hunger. And what we found is that when you sleep deprived individuals, these naturally occurring endocannabinoids rocketed up by over 20% cranking up people's

appetite. And so these three ways lead you to start packing on, you know, when insufficient sleep is occurring, when sleep gets short, your waistline typically starts to expand.

And we now understand the reasons. If that wasn't bad enough,

it is bad enough. Can you just stop, please? Honestly, I'm really... The last thing that we discovered is that let's say that you're trying to be really careful and you're trying to diet and you're trying to lose weight. If you're not getting sufficient sleep, then 60% of all of the weight that you lose will come from lean muscle mass and not fat. I know exactly. So in other words, when you are dieting, but you are underslept, you lose what you want to keep, which is muscle, and you keep what you want to lose, which is fat. So again, it's not an ideal situation.

My last question for you, in fact, was of all the subject matter we've talked about, what is the most interesting thing we've missed in your view? The thing that you think is most pertinent or interesting or significant or that perks people up or sits them on the end of their chair when you discuss it? I think the only other area that fascinates people even more than sleep is dreaming. So dreaming above and beyond the stage of which it comes from, which is principally called rapid eye movement sleep or dream sleep, REM sleep provides a set of physiological and beneficial benefits. But dreaming we've now discovered even above and beyond that provides benefits and it provides at least two benefits. The first is creativity. I was telling you that during deep sleep, you cement individual memories, you grab memories and you shift them from a short

term storage reservoir to a long term storage reservoir and you strengthen the circuit of those memories. So you future proof information, but that's individual memories. What we discovered

is that sleep is much more intelligent than you ever thought possible, that it's during REM sleep and particularly during dreaming that we take all of the individual pieces of information that we've been learning and we start interconnecting them and associating them with all of our back catalog of stored information. And so what dream sleep, one of the functions of dream sleep is to cross link and associate new memories together. So you wake up the next day having after dream sleep with a revised mind web of associations and those are capable of defining solutions to previously impenetrable problems. So think of dreaming as it's almost like informational alchemy that you start to fuse things together that shouldn't normally go together.

But when they do, they cause marked advances in your thinking, in your productivity, in your ingenuity. And in that way, you go to sleep with the pieces of the jigsaw, but you wake up with



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the puzzle complete. And I would argue that that's the difference between knowledge, which is remembering the individual pieces and wisdom, which is knowing what it all means when you fit them together. That's one of the functions of dreaming. It's the reason, by the way, that you've never been told to stay awake on a problem. The other function of dreaming that we know of is that dreaming provides a form of emotional first aid, that we've done a lot of work and we came up with a theory that was called dreaming as overnight therapy. And what we've discovered is that when we go into dream sleep, particularly based on its neurochemical profile and its physiological anatomy of the brain, the dreaming brain will take difficult, painful experiences, sometimes traumatic experiences. And it will essentially strip away the bitter emotional rind from the informational orange. So let's take a step back. What makes a memory emotional? What makes a memory emotional is that at the time of the experience, that experience triggered a strong visceral reaction. And that visceral reaction is useful to the brain. And it wraps that experience in this blanket of what we call emotion. It red flags it and prioritizes it in the brain. So now you've created a memory of an emotional event. In other words, you've created an emotional memory. But what dream sleep does is then it takes that useful emotional memory, and it will detox the emotion from the memory. It strips the bitter emotional rind from the informational orange. It's almost and that's why we called it overnight therapy, so that the next day you come back and now you feel better about those experiences. So you have a memory of an emotional event, but is no longer emotional itself, you don't regurgitate that same visceral reaction that you had at the time of learning. So the brain has done this elegant trick of stripping the emotion from the memory. So that's the second benefit, is that it provides, it's not time that heals all wounds. It is time during sleep and particularly during dream sleep that provides emotional convalescence. It's funny because there's a stereotype that we should never go to bed angry at each other. You will wake up far less angry as a consequence. Matt, we have a closing tradition on this podcast where the last guest asks a question for the next guest, not knowing who they're going to ask it for. The question that's been left for you from our previous guest, obviously they didn't know who they're leaving it for, but it's a very, I love these questions when they're challenging. What is the biggest way in which you are a contradiction? Gosh, I'm a contradiction in so many ways. I think I'm a contradiction in the sense that within my profession, with this field of sleep, I feel very comfortable. I'm reticent to say confident, but I am very comfortable to get on stage, give a TED talk in front of a couple of thousand people and my heart rate will be very stable. I probably don't feel, I feel more myself on stage alone in front of thousands of people than I do at any other time in my life. That's where I feel most myself. But yet, I'm a contradiction because offstage, I'm very insecure. I am very much an introvert. I'm very shy. I don't like being the focus of attention. And so those two things I've often wrestled with, but the more people I've spoken to, sort of now being out in the public sphere and sort of being more in this sort of public intellectual realm, you start to meet very famous people and you meet musicians and what you learn is that they're very similar, that they say that they become this version of themselves onstage. And then when they're offstage, they are a radically different person, but I am such a contradiction in that sense. I feel very comfortable and very secure onstage in front of thousands of people. And for many people, public speaking is one of the most angiogenic

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things you can ask anyone to do. But for me, heart rate is probably in the mid 40s, very relaxing for me. But then put me in a room, in a small room of a couple of people and my heart rates probably through the roof and I've become very introverted. So I'm a contradiction in that sense. Matthew, thank you. Thank you for making the time today. I've wanted to speak to you for many, many years and you absolutely never disappoint anybody. So it's very kind of you to say. It's exceptionally important work and as you said at the start of this conversation, we often neglect the medicinal properties of a great night's sleep over things like diet and medicine or exercise whatever else it is. But your voice and the passion that sits behind it has led a charge in society which is waking us up, no pun intended, to the virtues and the power and the importance of having a great night's sleep. But in a nice way, in a way that I find really empowering and actionable and that's the most important thing. So thank you for that, Matthew. Thank you and thank you for saying that last part especially. I don't think I can lay claim to that sort of early on. I think I'm doing much better. I'm doing a little bit better as a public communicator. I'm being less puritanical and dictatorial in my sleep message. I think I did a terrible job coming out. I'm learning and I'm being more sensitive but I'm always lovely to hear feedback from folks about what I'm not doing well because I would love to do this better and better if I can. But thank you for saying those kind words and thank you again for having me on, giving me this opportunity to speak. I now will anoint you as a sleep ambassador from this point forward. So thank you so much again, Stephen. Thank you so much, Matthew.

Quick word from one of our sponsors. I have to say I've been on a bit of a journey with this brand because when I started my business in new territories, when we first moved social chain to New York City, the first place we went to was WeWork. We moved four of our team members out to

New York City and we built the business from there. I have to say there's something magical about WeWorks. I've spent the last two or three weeks in LA in a WeWork and as you walk in the front door every day, it's almost like that sense of community, that sense of magic, excitement, camaraderie is tangible. And you don't get that when you're working at home. You don't get that often when you're sat in your bed on your laptop. There's something about getting out and getting into a WeWork that makes me feel a sense of entrepreneurship and creativity and building.

And the way that WeWorks are designed both in the way that they offer subscriptions so that you can work on demand, but also the flexibility of the contracts means that it's just the perfect place for businesses to scale their companies. And if you haven't checked out WeWork and you want to, you can go to [we.co.co](https://we.co.co) where you can try out your local WeWork for the

day at 50% off. Just download the WeWork on demand app and use the code diary at checkout.

You know, I never really usually pick the chocolate flavoured fuels. My favourite are the banana flavour. I love the salted caramel flavour. But recently, I think I in part blame Jack in my team who's obsessed with the chocolate flavour fuels. I've started drinking the chocolate flavour fuels for the first time and I absolutely love them. My life means that I sometimes disregard my diet and it's funny that's part of the reason why I've had a lot of guests on this podcast recently that talk about diet and health and those kinds of things. Because I am trying to make an active effort to be more healthy, to lose a little bit of weight

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as well, but to be more healthy. And the role that Hewlett plays in my life is it means that in those moments where sometimes I might reach for, you know, junk foods, having an option that is nutritionally complete, that is high in fibre, that is incredibly high in protein, that has all the vitamins and minerals that my body needs, within arms reach that I can consume on the go is where Hewlett has been a game changer for me.