

(TC: 00:00:01)

Dr Hazel Wallace: Hello, and welcome back to another episode of The Food Medic podcast. I'm your host, as always, Dr Hazel. Thank you so much for your feedback on last week's podcast episode with James Clear. It seems that all of you loved it just as much as I did, which wasn't a really big surprise, if I'm honest. If you missed it, make sure you go back and listen to it after this episode because there were a lot of great takeaways, but don't go anywhere just yet because I have an equally great show lined up for you today. Our guest is Kirsten Holmes, who is the Vice President of Performance Science at WHOOP. Now, WHOOP are kindly sponsoring this season of the podcast, which I am incredibly grateful for and very excited about. So, when we set the partnership up, I asked if I could sit down with Kirsten and get really geeky about the science behind WHOOP and how we can enhance our performance and recovery. Kirsten works with top researchers and hundreds of the best tactical, pro and college athletes and teams in the world, to optimise training, recovery and sleep. In addition to her extensive professional and academic background, Kirsten was a three times All-American and two times Big Ten Athlete of the Year at the University of Iowa, competing in both field hockey and basketball. She was a seven-year member of the US national field hockey team and one of the most successful coaches in Ivy League history, having won twelve league titles in thirteen seasons and a national championship at Princeton University. She is an incredible woman and I'm very excited to speak to her today.

[AD break]

So, thank you so much for joining me today.

(TC: 00:03:20)

Kristen Holmes: Thank you for having me.

(TC: 00:03:22)

Dr Hazel Wallace: I've been really excited to have this conversation and doing the prep for the podcast, just learning a bit more about you and you've got such an interesting background, so I think I'd just love to start there and learn more about, kind of, what you've done in terms of academic and also your sporting background and what you're doing now.

(TC: 00:03:41)

Kristen Holmes: Yes, it's definitely varied. I've spent most of my life in sports and athletics, and that's definitely where my, kind of, academic interests lie. You know, I've always been really fascinated by the interplay between the psychology and the physiology and unpacking that. So, a lot of my academic work has been centred around that. I have a master's in Psychology and Sports Performance and I'm a PhD candidate at the University of Queensland, so I'm working hard on a dissertation looking at the impact of circadian alignment, autonomic control and physiological feedback on measures of resilience. Then, athletically, yes, I played a couple of sports in college, in the Big Ten. At the University of Iowa I played field hockey and

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basketball and then went on to play for the US field hockey team. One of my most heart-breaking final matches was in a stadium in the United Kingdom, at Milton Keynes. We lost to China in the Olympic qualifier so, yes, it was quite sad.

(TC: 00:04:47)

Dr Hazel Wallace: Yes.

(TC: 00:04:48)

Kristen Holmes: Yes.

(TC: 00:04:49)

Dr Hazel Wallace: So, now, you are the VP at WHOOP. What does your role entail there within the company?

(TC: 00:04:56)

Kristen Holmes: Yes, so I primarily aim to stand up research where we can look at various behaviours and then, you know, tie them back to the metrics that we track at WHOOP. So, really trying to understand, you know, which behaviours lead to optimal biometric outcomes, and then trying to take those insights and productise them. For example, if we learn, you know, the ultimate breathing protocol for sleep, we would want to build that into the app. So, we've got some research going on that answered that exact question, actually, which is quite exciting. It's in peer review, right now, so I can't reveal the actual protocol, but the whole intent of doing this type of research is to better understand how to apply our effort. You know, there's a lot of noise, I think, in this industry, just generally, the health and optimisation industry, that is. You know, it's really, kind of, my life's goal to pull this signal out and make that accessible to folks so they understand how to apply their effort if, in fact, longevity and optimal health is a goal.

(TC: 00:06:03)

Dr Hazel Wallace: Absolutely, and so how did you first get into wearable technology because I'm assuming you had an interest before you joined the company?

(TC: 00:06:10)

Kristen Holmes: I did, yes. So, I was a head coach at Princeton University and also taught a seminar there, aptly entitled Performance Optimisation. In my coaching, you know, we were using all sorts of wearable technology to measure external load and internal load, and obviously we were taking in tonnes of subjective markers as well. What I noticed in the data, over the course of the, you know, ten years or so that we were tracking all of these things, is that there was very little relationship to what was happening during training and next day capacity. So, you know, what I was doing to them during the training session didn't really have a strong relationship to how they showed up the next day. So, what I came to realise pretty quickly is that it's the other twenty hours that they're not with me that have the most impact, and this is where I started to really dig into some of the other factors that influence performance outside of just training load. So, looking at factors like sleep and hydration and nutrition, you know, and psychological influences like purpose, efficacy and control. A lot of this I'd been studying prior to even arriving at Princeton University, where I was coaching. So I was already, kind of, putting together this performance education over the span of my career and delivering that to my student athletes. What was tough, I think, is that there was very little quantification

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of some of those factors, so I started building my own technology at Princeton to really try to quantify some of these other behaviours that were going to influence the capacity of my athletes, you know, to, kind of, show up for training and be able to do the work.

Yes, so that's, kind of, where my interest really was sparked, was just this knowledge that training actually had very little to do with next-day capacity, which I think is quite an, 'Aha,' moment for most people and people might come, you know, with pitchforks at me because of that statement, but we're not talking about just 24 athletes, I mean, this has been proven over and over again with hundreds of thousands of folks on our WHOOP platform. So, it's, kind of, interesting, and what's exciting about that knowledge is that athletes actually have way more control than they realise, right? If they understand what to pay attention to and how to think about their sleep and their hydration and, you know, their fueling strategies and how to really take stock in the most important psychological needs that we have and build an infrastructure around that on a daily basis, like, you can start to really control your performance levels and show up with a level of capacity that enables you to do your best work. Yes, so that's really, you know, kind of, this whole excursion in understanding the factors that influence performance led me to WHOOP because that was really what WHOOP was trying to solve and we were trying to solve it at the same time. That's where I met the CEO of WHOOP and, you know, I decided to join forces. So, yes, that's, kind of what led me to WHOOP.

(TC: 00:09:12)

Dr Hazel Wallace: Amazing and I love the emphasis, as well, on recovery. I do completely agree with you there. I think, for some people listening, they're not going to fully understand what a WHOOP is and how it differs to, kind of, other wearables on the market.

(TC: 00:09:28)

Kristen Holmes: Yes.

(TC: 00:09:29)

Dr Hazel Wallace: So, can you, kind of, just briefly summarise what the purpose of a WHOOP is versus, say, a standard fitness tracker or a smart watch?

(TC: 00:09:36)

Kristen Holmes: Yes, you know, WHOOP, really, at our core, we're a data and analytics company so we take all of these biomarkers and transform them to give you insight into how your body is responding and adapting to external stress. We measure that in the form of WHOOP recovery. So, WHOOP recovery is on a scale of 0 to 100 (TC 00:10:00) and it basically gives you an indication, again, of how you're adapting to external stress. We also measure sleep, and we go really deep on sleep. I think we're probably the most accurate wearable out there in terms of our ability to not just understand when you're asleep and when you're awake, but actually how much time you're spending in the various stages of sleep, and then be able to coach you to a better future. Then, strain, it's a summary statistic of your cardiovascular load. So, I think what's important with strain is that we tell you not just what you're doing during your workout, but what's happening over the course of the day. So, you know, more of a cardiovascular picture of what you're doing to your body, as opposed to just steps, for example, which is very arbitrary and doesn't really give us a whole lot of insight, and then I think that's one of the core differentiators of WHOOP is really this cardiovascular

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picture, which I think is really important. Then, being able to compare, you know, fitness levels over time and, kind of, if you walk today, what that looks like cardiovascular versus your walk in three weeks, you can compare and contrast. So, really, it's a 24/7 physiological monitoring device, you know, that looks at strain, sleep and recovery on a continuous basis, so it's a 24/7 tracker. It's designed to be worn 24/7, you don't have to take it off. The battery just slides over the top, so you never have to take it off to charge it.

So, you're literally getting, kind of, this really robust, 24/7 picture. Then, I think, just, like, the signal accuracy, which I always feel like I have to call out. I mean, anything that you're wearing on your wrist, or even on a ring, the raw signal quality can be quite noisy, so I think we've, you know, developed a set of really sophisticated algorithms that take this signal in almost any condition and can filter out the noise sources really, really accurately. So, I think we're giving you a really accurate picture of what's actually happening physiologically.

(TC: 00:12:02)

Dr Hazel Wallace: Absolutely, and, I mean, I was so impressed with the amount of data and the insights that you can get from it because prior to my investing in a WHOOP, a lot of my friends were wearing them and I didn't fully understand, if I'm completely honest, like, what the big appeal was until I actually started using it myself, and then realised how it was starting to shape my health behaviours. Sleep comes to mind as one of the biggest things that it's changed for me, especially when you can input in your daily journal the things that, kind of, you did the night before and how that impacted your sleep, and then getting your dataset at the end of the month and you're, like, 'Wow, wearing a sleep mask improves my sleep, and reading before I go to bed. It's really interesting.

(TC: 00:12:54)

Kristen Holmes: Yes, the behaviour modification piece is definitely a core differentiator, there's no question. We see this across every population we work with from, you know, corporate executives to front-line healthcare workers to professional athletes. You know, I think, putting these data that are consumable and actionable in the hands of the individual is really-, the other insight that I learned from coaching is that, you know, me trying to prescribe these behaviours and get my athletes to do them on a consistent basis was really hard, but when they start to see the performance cost of specific behaviours, for example, what does drinking alcohol really do to my sleep? What does it really do to my recovery? To be able to see that in black and white, I think, is really a powerful forcing function for change. So, yes, we do see this across all populations.

(TC: 00:13:49)

Dr Hazel Wallace: Yes, absolutely, and you mentioned some interesting research that you guys are doing at the moment, and I know, kind of, from the regular emails that go out and the WHOOP newsletter, that you're constantly doing research and really interesting research. Can you share any, perhaps, cases studies or some of the most recent stuff that you guys have been doing?

(TC: 00:14:09)

Kristen Holmes: Yes, I mean, I think, you know, we're a product that takes a lot of pride being grounded in science, so all of the algorithms that we have are based on tonnes of existing research and then it's

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supplemented by our own insights, just looking at our member data and huge, millions and millions and millions of sleeps. You know, so we have just these incredible, robust datasets that we're able to use to train our algorithms and become more accurate. So, I think, you know, some of the research that I'm involved in right now, there is very little published data that validates the link between emotional states, motivation profiles and emotion regulation with real-time physiological data, outside a lab. So, kind of, taking, you know, WHOOP and putting it on the wrist and then being able to see what's happening cardiovascularly and how that might be linked to certain emotional states is really valuable, right? We know that there is this powerful link between the psychology and the physiology, but we don't necessarily understand what that interplay really looks like and how our behaviours are actually informing the strength and resilience of that link or the direction of that link. So, that's a lot of the research that we're involved in right now, and we're definitely seeing, you know, some behaviours that are surfacing that actually predict resilience. So, one of the recent findings is sleep consistency has really bubbled to the surface as the behaviour that predicts cardiovascular resilience as measured by heart rate variability and resting heart rate. This is looking at a massive dataset, you know, we're talking thousands and thousands of folks. The study design was basically looking at member data pre-pandemic and then, once the lockdown hit, the data post, so three months before, three months after.

We were looking for, kind of, you know, what is the signature that most predicts physiological resilience? What bubbled to the surface was sleep consistency, so the degree to which you stabilise when you go to bed and when you wake up. This obviously makes a whole lot of sense, you know, if we think about our circadian rhythm and our sleep how it's, obviously, modulated by our interaction with day and night. Again, when we go to bed and when we wake up truly influences the degree to which our systems are able to function at our most efficient levels. So, it's not surprising, but it was really cool to see this unequivocally surface as the most important behaviour, so that's, you know, one finding that I think was really interesting.

(TC: 00:16:46)

Dr Hazel Wallace: Yes, really fascinating.

(TC: 00:16:49)

AD break

(TC: 00:17:48)

Dr Hazel Wallace: We keep mentioning recovery and things like HRV, how exactly does WHOOP calculate recovery? What are the, kind of, metrics it's based on?

(TC: 00:17:58)

Kristen Holmes: Yes, so the recovery algorithm takes heart rate variability, resting heart rate, and we take those values during the night, so when conditions are most stable and most consistent. Then, we look at respiratory rate also during the night, and that's just, kind of, a summary statistic, we take every breath over the course of your sleep and then average that, and we use your respiratory rate in our algorithm and then your sleep performance. So, that, kind of, makes up our WHOOP recovery algorithm and recovery is really a concept of autonomic nervous system adaptation, you know, which incorporates all of the inputs that I just mentioned. So, yes, that's, kind of, how we think about WHOOP recovery.

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(TC: 00:18:41)

Dr Hazel Wallace: Yes, and heart rate variability, I feel like is getting a lot of airtime recently.

(TC: 00:18:47)

Kristen Holmes: Yes.

(TC: 00:18:48)

Dr Hazel Wallace: Like, a lot of different, kind of, organisations are using it. It wasn't something that was focused on as much before. How can we improve our heart rate variability?

(TC: 00:20:57)

Kristen Holmes: Yes, and obviously it makes me wildly happy, so happy, that heart rate variability is being, you know, taken more seriously and people are starting to focus on it because it's a measure of your autonomic nervous system and it's really considered the best objective metric to understand your physical and mental readiness, which is important for a lot of reasons. I think if you're going to focus on one metric, you know, heart rate variability just gives you a really great snapshot of just how you're adapting to all the stressors in your life, again, both physical and mental. I think it's just important to understand and, again, it's just one of the inputs into our recovery algorithm, but we do weight it the heaviest of the four inputs and there are a lot of physiological reasons why do that. The research has shown, too, when you do pay attention to it your health actually improves, so it's a really good marker to pay attention to. (TC 00:20:00) I think some of the core things that influence your heart rate variability are (1) just you're managing stress throughout the day, you know, and being really proactive and paying attention to the balance between, kind of, stress and rest. You know, stress in and of itself is not bad and obviously it's really important for us all to take on stress, right, to build resilience and to get stuff done. You know, when we feel stressed, it's usually just our body sending us a signal that it's time to take action, so that's not necessarily a bad thing, but we also need to have tools to understand how to deactivate, right? Chronic activation is what leads to, kind of, chronic stress and burnout, right?

I think one of the best ways to create autonomic balance, right, which is what HRV will be a measure of, either imbalance or balance, and a higher HRV means there's balance and, you know, controlling stress throughout the day is one of those ways to really mediate heart rate variability. You know, some intentional breathing. The most efficacious is a technique called resonance frequency breathing, which basically just maps your respiratory rate and heart rate in a frequency that is optimal for you. Most adults are at 6.0 breaths per minute, but the range is going to vary slightly, but resonance frequency breathing has emerged in literature as the most efficacious in mediating heart rate variability, so that would be one to pay attention to. I think generally just breathing through your nose throughout the day, as opposed to out of your mouth, is also a way to really help heart rate variability, and it sounds so simple, but I think most people aren't necessarily focused on their breath, but there's a lot of research out there as well that points to nasal breathing as being really efficacious to helping stabilise our autonomic nervous system. It also helps with sleep, and sleep is the other one that will definitely influence your heart rate variability, and again if you can focus on stabilising that sleep-wake timing, we know that that correlates to next day heart rate variability, so

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sleep consistency, and the quality of your sleep obviously, and actually sleep consistency drives sleep quality. Again, both will influence your heart rate variability.

And then I think the other thing that's really poor is just the timing of the meals. We see this in the data, and there's a lot of good literature out there that suggests we should bias towards earlier in the day, and I think for listeners, to make it real simple, try to eat when the sun is out, and try to not eat when the sun goes down, because I think most folks probably don't realise this, but waking and obesity is really hormonal, which suggests that it's aligned with our circadian rhythm. Again, this pull toward lightness and darkness, and being able to align our behaviours so we're in sync with the natural cues in our environment. Obviously you have evolutionary roots, but something that people can grasp on to that will really have a profound impact on recovery and HRV. So, sleep timing is quite massive. So, those are a few things, maybe I mention one more that also relates to circadian rhythm, and has a profound influence on when you actually feel sleepy, so this will enable you to have consistent sleep time, and that is one of the most important behaviours that will toggle on to that, is viewing light in the morning. Again, most of the things I'm mentioning here are democratically available, right?

They're free, so it's just a matter of being disciplined about them, but viewing light within 20 minutes of waking up, prior to 9:00 am, even if it's cloudy. That photon energy from the sun is really central in setting our circadian clock. It's basically that getting outside within 20 minutes of waking up, prior to 9:00 am for five to ten minutes will give you the photon energy you need for your body to then know that it's time to be alert. It's really important to get that cortisol pulse going, and to tell your body that it's time to be awake, and then that starts the clock on, 'Okay, I'm supposed to be awake,' and then twelve hours later, we'll be building pressure throughout the day, and then that will lead to a point where you actually start to feel sleepy at night, but that first moment of sun is really going to be the precursor that kicks all of that off.

(TC: 00:24:33)

Dr Hazel Wallace: Absolutely. One of the things you mentioned obviously is meal timing, and I guess nutrition as a whole is really important when it comes to recovery. Do you think that nutrition will be integrated into the app at any point?

(TC: 00:24:48)

Kristen Holmes: Yes, I mean baby steps. I think for me, just given the research that exists out there, I really want to help folks think about the timing of their meals first. So, when we think about the order of operation, get them meal timing right. I know this isn't going to be perfect every day, but if you can, four of the seven days, eat when the sun's out, and not eat when the sun's down, you'll really be helping yourself.

(TC: 00:25:21)

Dr Hazel Wallace: Obviously we've spoken quite extensively about recovery, but one of the things that I wanted to ask you is whether you have gained any insights into sex and gender differences when it comes to recovery, from the data that you guys have collected, or is that something that's not really been looked at yet?

(TC: 00:25:38)

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Kristen Holmes: Oh yes, definitely. Actually we have a paper in peer review right now that looks at people who identify as men, and folks who identify as women, and how those differences manifest in Whoop recovery, and how they build strain. I can't talk specifically, but there are massive differences, and they definitely fluctuate with the cycles of women. We definitely have very different, and this is relatively well-documented, but different phases of our cycle. We're going to be more adept at certain types of workouts, for example, and it might need different levels of recovery based on where we're at in our cycle. But yes, those differences are quite profound actually, and there's a lot of really great research out there, Rayco (ph 26.31), and FitrWoman, and Wild AI. There's lots of technologies that are trying to help females in particular better understand how their cycle influences their capacity to take on volume and intensity, and what that actually means for recovery, and what's cool about what we're doing is we're actually able to quantify all that. So, it's a lot less active input by the user. We can actually passively collect all this data, and then be able to give you recommendations without a lot of user interaction, which is really cool. So, we're building toward that, that's coming. What we do currently have is we have a sleep coach feature based on where you're at in your menstrual cycle. So, one of the things that we saw in our data is that your sleep efficiency absolutely varies by your menstrual cycle phase. So, people who menstruate will definitely need to allow more time in bed during the luteal phase, to offset the reduced efficiency.

So, for example, if a female member typically spends 7.5 hours of sleep in an eight hour sleep opportunity, that member would want to give herself 8.25 hours to get the same 7.5 hours, in order to feel your best. What's cool is that Whoop does all of this adjusting for you. You don't even need to think about it, all you need to do is just listen to Whoop's sleep need recommendation, and it will automatically adjust how much time you need to be spending in bed, which is really cool, and I have another super cool finding that just came out around sleep need recommendations, and how they correlate to executive functioning and working memory, if you want me to reveal that.

(TC: 00:28:19)

Dr Hazel Wallace: Yes, I'd love to. Okay.

(TC: 00:28:22)

Kristen Holmes: And this is again, a lot of the research just understanding emotion regulation. Some of these things that are a little bit less abstract, and less tied to the physiology, and really trying to unpack this, and this one is really the cognitive measures, looking at executive functioning, and working memory. We just call these, I guess, for lack of a better word, performance data, executive functioning and working memory. We measured them via Stroop and NBAC, over the course of a six month study, and what we saw is such a strong p-value, it's almost a causal relationship between the sleep debt that folks accumulate. So, the more sleep debt, the worse they performed on the NBAC and the Stroop next day. So, sleep debt is a metric that we reveal, we surface to our users to help them understand what they needed to get for sleep. So, how much time Whoop told them to spend in bed, versus what they actually got. That delta shows up as your sleep debt, and it accumulates over the course of the days, so you can start to see an accumulation of sleep debt, if you're missing your sleep need, and I can talk how this actually relates to illness and injury burden and availability in sports. There's some separate research we've done looking at that, which is fascinating, but this one little metric of sleep debt predicted executive functioning and working memory.

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So, literally if you keep your sleep debt below 30 minutes, your cognitive functioning is going to be far superior than if you allow this sleep debt to accrue, (TC 00:30:00) and we see as much as 40 minutes of sleep debt will impact your next day working memory and executive function. So, basically, because your sleep debt is an input to your sleep need recommendation-, so we take your baseline, we take any naps you took, we take your sleep debt and your strain, so how much cardiovascular load you've accrued. So, we take those four inputs, and we use that to give you a sleep need recommendation. So, a lot of the sleep scientists come at me like, 'Your sleep need is just totally made up.' And obviously it's based on a tonne of physiology, and a lot of external research, and we've kind of fit it to our ecosystem, but this sleep debt, the fact that sleep debt correlates, it's such a strong relationship, we basically indirectly validated our sleep need recommendation. So, if you literally listen to Whoop sleep (mw 30.53) recommendations, you will show up tomorrow with more availability, not just physically, but mentally as well, which is pretty cool, yes.

(TC: 00:30:59)

Dr Hazel Wallace: That's amazing. And so, can you make that up by napping the next day, if you've had a poor night's sleep?

(TC: 00:31:07)

Kristen Holmes: Yes, and that is really the protocol. So, when we were working with elite teams, and corporate executives, anyone who's interested in reforming at the highest level, we know that there's this relationship between executive function. Illness and injury burden also correlate to sleep debt. So, if you wake up with 30 minutes of sleep debt, for example, the recommendation 100% is to map that sleep debt with a nap. So, generally speaking, keep it to an ultradian cycle, so nothing more than 90 minutes, but that is definitely the recommendation. So, you can't make up for lost biological sleep necessarily, but you can definitely buffer the impact by incorporating a nap during the day. Again, make sure it's prior to 2:00 pm. Anything after that is going to have actually a deleterious effect on next day's sleep, and could potentially impact your nocturnal sleep experience, and also could delay your sleep onset latency, how fast it takes for you to fall asleep. So, you want to be careful about when you nap, but that is 100% the recommendation, to keep sleep debt at bay, is to use naps strategically.

(TC: 00:32:18)

Dr Hazel Wallace: Absolutely, and so you mentioned sleep debt and injury and illness, can you speak to that a little bit, and what you've learnt there?

(TC: 00:32:29)

Kristen Holmes: Yes, so obviously I was a coach for seventeen years, so it was all about availability, right? You're doing everything you can to ensure that your athletes are available for training, and a lot of that does in fact have to do with the volume and intensity, but generally speaking, in elite level athletes, nothing you can really do in a two hour training session is going to injure them, right, if they are coming to your training session with capacity. And the way to come with capacity is to meet your sleep need, most simply, and we saw this in a study that we did with 230 collegiate student athletes, and basically the sleep debt again, the folks who kept sleep debt below 30 minutes, not one of them actually got injured, which is insane, right? Obviously there's luck involved in that, clearly, but most importantly over the six month period, no-one got sick. So, sleep debt, again, you keep it under 30 minutes, you're really positioning yourself to be illness- and

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injury-proof. I know, it's crazy. And I think too, when we consider availability, and what that predicts in team sports, there's some really cool research around that. I think Ray Smith and colleagues, it was basically looking at performance success or failure, and how that's influenced by weeks lost to injury and illness, and I think this was in track and field athletes, but it was a five year prospective study, so it was a long study, and they basically saw that by lowering illness and injury burden, it enabled athletes to complete the prescribed training, and this availability basically was ten times more likely for the team to optimise its individual and therefore its team potential.

So, basically the formula explained 86% of successful seasons. So, it seems probably obvious, but I think what's so cool about this is, again it's understanding how to apply your effort, right? I want to be able to tell my athlete one thing that they can do. If they literally keep their sleep debt below 30 minutes, and that's the only thing that you focus on, if that's the anchor, right, that is going to influence really all the behaviours, right? Because in order to keep your sleep debt below 30 minutes, that means you have to limit the time awake, you have to actually get quality sleep, you'd have to go to bed and wake up at consistent times. So, you can start to back into these other behaviours that are really central, but it's measured. How well you're doing these other things, basically you can quantify it in this sleep debt metric. (Advert plays 35.12-36.12)

(TC: 00:36:13)

Dr Hazel Wallace: Yes, and a lot more people are giving sleep as well more attention, and I guess with the likes of Why We Sleep and books like that, we're realising it's a lot more important than we previously thought for performance, physical health, mental health.

(TC: 00:36:30)

Kristen Holmes: It is literally the greatest, and Dr Matthew Walker, you referenced Why We Sleep, which is just brilliant, and as a sleep evangelist, I just have so much gratitude for this man, and what he's done to just evangelise this concept, because we think about root cause mortality, it's insufficient sleep, right? When we think about cardiovascular disease, and I think he makes the case in the book of why insufficient sleep is root cause to all mortality. So, I think if we're not thinking about sleep, and figuring out how to get the best possible sleep, then we're really doing ourselves a huge disservice, right? How we sleep really determines how we show up. Yes, and Dr Matthew Walker has just really been so helpful in getting that out to the forefront.

(TC: 00:37:19)

Dr Hazel Wallace: Yes, and making it so accessible. I feel like everyone's a sleep expert now, and there's things that are very much common sense when it comes to getting a good night's sleep, but then obviously you guys are collecting data all the time from people who are inputting into their sleep journals, and then applying that to how much sleep, and how good quality and deep sleep they're getting. So, what are the fundamental things that you found that are really important for not just quantity but quality of sleep?

(TC: 00:37:59)

Kristen Holmes: Yes, so there's quantity, there's quality, and there's consistency, right? So, those are the three pillars of sleep, and I think the biggest behaviour that influences your potential for quality sleep is the degree

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to which you stabilise your sleep-wake timing, right? So, I've kind of been talking about that throughout the podcast. If your project is to get better sleep, start with stabilising your sleep-wake timing. So, just try to make that as regular as humanly possible, and in order to have a regular sleep-wake timing, one of the other most important behaviours is really getting that sunlight exposure within 20 minutes of waking up. And these are things that I don't know that people think about a whole lot, and then watching the sun set at night, that's basically going to tell your body to deactivate, and that, 'Oh, it's time for sleep.' So, you're sending signals to your body that, 'Okay, it's time to wind down, it's time to get some sleep.' And then I think the next piece to that is, alright, how are you phasing into the evening? You want to make sure that you're not exposing yourself to tonnes of artificial light, because again, when your eyeballs see that light, it signals to the brain again that it's time to be awake. So, to get a quality night's sleep, you'd want to try to help your body understand what it needs to do next. So, limit the artificial light exposure, to the degree that you can, make your bedroom as cool as possible, and then snuggle up with warm blankets, and I know not everyone has the privilege of having air conditioning in their home, and can't keep their room at 64 degrees, but to the degree that you can, try to keep your room cool, dark, quiet, those will also impact your sleep quality. And then again, meal timing, and just what's happening mechanistically here is that if you eat a lot of food once the sun goes down, and close to bedtime, all of the resources that typically would go toward helping you get quality sleep, which is basically measured by how much time you're spending in these deeper (TC 00:40:00) stages of sleep, but what happens when you eat close to bedtime is you divert resources toward digestion. Because sleep and digestion are both parasympathetic activities, you can't do both at the same time, and your body will prefer to digest food before it will sleep. But it just has to, right? It doesn't have a choice. So, it has to take care of the stuff in your belly before it can focus on sleep.

So, I think that's really important for folks to understand if again, they want to get quality sleep, and we see meals close to bedtime is one of the top influencers on next day recovery, and that's one of the things, to your point, we get to track in the journal, is when you're eating your meals, and we're seeing this surface in the study that we're doing with 700 collegiate athletes as well, looking at pre-bed meal timing. It seems to have a relationship to heart rate variability. So again, I think really important. Then alcohol is probably the other behaviour, and that is probably at the tippy top. So, any alcohol within two hours of bedtime is no question going to influence your sleep, because alcohol is a sedative, you might feel like you're sleeping, but the reason why, after you drink alcohol, you wake up feeling really crappy and not refreshed, is because you're spending no time in deeper stages of sleep. Your heart rate is usually jacked, your heart rate variability is suppressed, so your respiratory rate is higher. So, all the makings of a not restful night time experience.

(TC: 00:41:36)

Dr Hazel Wallace: Gosh, I feel like alcohol has the biggest influence on my recovery when it comes to Whoop. The only time I get red recovery is if I've had a drink the night before.

(TC: 00:41:46)

Kristen Holmes: I know, I know, it's really kind of depressing. But yes, sometimes our members will see one glass of wine, and they'll wake up with a better recovery the next day than maybe they typically have, and actually there is a sweet spot, I think. Alcohol has some real positive effects, depending on what kind of alcohol you drink of course, but one glass of wine with friends, around a meal, it's kind of the social

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connection that happens, can actually have a real positive effect on your psychology, and as we know, your psychology influences your physiology and vice versa. Yes, so it doesn't mean you can't have alcohol, but it's just about being smart about the timing, and just making sure that you're hydrating appropriately. Having water is important.

(TC: 00:42:37)

Dr Hazel Wallace: Absolutely, and I guess circling back to shaping behaviour, I'm sure for people who are top level athletes, and using devices like this to track their recovery, if they're seeing that in real time, that it's really negatively impacting their performance scores, it's going to deter them from having a big night out close to a big event, or when they're in a hard training season.

(TC: 00:43:04)

Kristen Holmes: Yes, totally. I mean, this has been the coolest thing to observe in the time that I've been at Whoop, which gosh, now is like five years, is that across every single cohort we work with, especially in these high stakes environments, where deactivation is difficult. When you look at front-line healthcare workers, and tactical athletes, and professional athletes who come off of these really high stress jobs, and if they don't have the tools to understand how to deactivate, oftentimes they use alcohol to help them come down, and we've seen that over the course of the time on the platform, these folks in these high stakes verticals on average reduce their alcohol consumption by 89%.

(TC: 00:43:50)

Dr Hazel Wallace: Oh my God.

(TC: 00:43:51)

Kristen Holmes: I know. I know we can't see each other, but I'm smiling, just because I think that certainly my calling and my main project in life is just to help people understand how behaviours lead to the capacity to live your values with more joy and energy, right? At the end of the day, I think that's all what we're after, and not to paint this horrible picture around alcohol, but it does impact us, and it has a profound impact on our ability to show up for the people that we love, and for the things that we love. So, to be able to quantify that in such an elegant way, and be able to display that to our members, I think is a real contribution, I think, to humanity really. So yes, I'm really proud of the fact that we have a product that's able to modify behaviour in such a profound way.

(TC: 00:44:41)

Dr Hazel Wallace: Yes, I completely agree. It's really useful, and definitely changing how people perform, and health outcomes. I guess we've talked extensively about sleep, and so I imagine that you're going to put that right up there with your recovery strategies, but what would you say are the maybe top three most impactful changes that you think people can start today, to improve their performance and day-to-day health?

(TC: 00:45:12)

Kristen Holmes: Yes, I mean definitely the stuff that we've talked about, right? Stabilising sleep-wake timing, again, the most important behaviour. So, getting outside in the morning, and then while the sun's setting. Eat when the sun's out. Those are huge. I think the other things that really influence recovery, having

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a contemplative practice has been shown in the literature to be really powerful. Either gratitude journaling, or mindfulness meditation. Really I think just being able to control your attention, so you can attend to the things that matter, and you can find the signal through all the noise that's out there. I think mindfulness meditation, gratitude journaling, is kind of a path to that, and then I mentioned the biofeedback, the resonance frequency breathing. Hydration is so simple, but dehydration compromises your ability to recover in just profound ways. So, staying hydrated is so critical, and generally speaking, I think from a protocol standpoint, if you're not training a tonne, 0.5 ounces to every pound of bodyweight would be a good place to start, I think. You can definitely over hydrate, so you just want to monitor your levels. Anyway, hydration is really key, mobility is another thing that I think is probably not talked about enough, but I think if you look at the literature, how mobile you are later in life definitely influences your health, and your wellness, and your longevity, and staying off disease. So, staying mobile I think is really important. And then some sort of cold/hot therapy. Basically what I'm talking about, if you distil recovery down to, you're either activating the parasympathetic state, so you're either calming your nervous system, or you're activating the sympathetic, you're activating your nervous system, right? So, it's really recovery is about strategically activating and deactivating your autonomic nervous system. So, a lot of what I have talked about so far related to HRV-bound feedback, contemplative practice, hydration, mobility, are all parasympathetic activities. I think cold and hot therapy actually activate the sympathetic branch of the nervous system, which also is important, right? Because it's always about this balance. But cold and hot are going to temporarily suppress heart rate variability, and increase resting heart rate, but these practices lead to higher levels of resilience over time.

So, it definitely improves cardiovascular functioning, cognitive functioning, it's been proven in the literature, so when we think about recovery behaviour generally, mobility, hydration, cold/hot therapy, some sort of HRB, the biofeedback, I talked about resonance frequency breathing, and a contemplative practice would be my top ones, and this is based on just the oceans of science and literature that exist out there. I've kind of wrestled it to ground, and those are the top things that I would be tracking.

(TC: 00:48:15)

Dr Hazel Wallace: I want us to go back to gratitude, and have you noticed from the data that it has a tangible difference on people's recovery?

(TC: 00:48:26)

Kristen Holmes: Not in our data, per se. At a population level that hasn't surfaced in our data, but there is a lot of external research, really well done, controlled studies, that suggest that contemplative practice, so specifically a lot of research around gratitude journaling, and meditation and mindfulness, seemed to be linked to better mental health. Better mental health will lead to better physiological functioning generally, right? There's a bidirectional nature. So yes, there's a lot of external literature, we don't necessarily see that manifest in our data per se. But yes, it's definitely worth I think mentioning and inputting it in the top six of recovery behaviours that are associated with optimal biometric outcomes.

(TC: 00:49:14)

Dr Hazel Wallace: Yes, absolutely, and I think also, especially if you're doing it pre-bedtime, it's a journaling practice, a wind down, it's part of your routine, it switches you off. There's so many indirect benefits when it comes to performance and recovery.

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(TC: 00:49:29)

Kristen Holmes: There's no doubt, and I think it's probably worth mentioning, it is hard to study, because it's actually quite non-specific, right? If I were to tell you to do one thing, I'd probably say to do resonance frequency breathing, in terms of an order of operation, because I think that incorporates the breath, and doing it at a specific frequency, whereas meditation and mindfulness is really a skill you need to develop and get good at. That said, I think just sitting quietly, and just doing your best to be mindful (TC 00:50:00) of your breath, and keep your thoughts at bay is absolutely worth doing every day, but it is a bit harder for people. So, I think if you're looking to grasp onto a behaviour that can really have immediate impact on recovery, resonance frequency breathing is kind of the first thing to potentially do. Again, if we're talking about, we've mentioned six things, what is the order of operation, I would put resonance frequency at the top, and then I think to your point, doing some journaling at night generally speaking should help calm the mind, and then ending that journal listing three things that you're really grateful for tends to kind of position you to have a good night's sleep.

(TC: 00:50:37)

Dr Hazel Wallace: Amazing. So many takeaways there, that was such a fascinating conversation.

(TC: 00:50:43)

Kristen Holmes: Oh, I hope so.

(TC: 00:50:44)

Dr Hazel Wallace: Yes, absolutely. Well thank you for giving us your time today.

(TC: 00:50:49)

Kristen Holmes: Oh, it's my pleasure. I know it's a lot of information, but I think we want to spend less time on these things, not more time, and I think a lot of the research that we're doing is trying to again, find that signal, amidst all the noise. So people understand how to apply their effort, and can build practices that really do help them get on with their life, you know?

(TC: 00:51:12)

Dr Hazel Wallace: Yes, 100%, and so if people want to learn more about the research that you're doing, or the work that you're personally doing, are you present on social media?

(TC: 00:51:21)

Kristen Holmes: The Locker at our whoop.com website, we'll write about and podcast on all the recent research. The executive function study I referenced we actually just did a podcast on, so if you go to whoop.com, you hit The Locker, there basically is all of our articles about the research that we're doing, and then all the podcasts as well. I do not have a huge social media following, but I do post on Instagram about a lot of the stuff that I'm talking about today, it's Kristen_Holmes2126, and then I'm more active on LinkedIn. So, always will post about new research, and I try to really help folks understand what the research means, and how to apply it to their lives, and also I always outline what the limitations are of the research too, so people can take it with a grain of salt, and understand how they might apply it in the real world.

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(TC: 00:52:21)

Dr Hazel Wallace: Amazing. Well thank you so much again, and I hope you have a lovely rest of your day. Okay team, that was Kristen. I hope you enjoyed the podcast as much as I did. I just loved diving a bit deeper into the science around wearable technology, and learning more about how we can use devices like Whoop to really enhance our recovery and performance. If you loved this episode, you know the drill. Leave a rating, leave a review, and we'll see you again next time.

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