DANNY LENNON: On to today's episode. And we are again talking about one of my favorite aspects of health and performance and that is sleep.

I'm talking to sleep researcher, Dr. Amy Bender, who is the clinical program director of Affix Services at the Center for Sleep and Human Performance as well being a joint professor in kinesiology at the University of Calgary. She has a PhD from Washington State University, where she specialized in sleep EEG and her current research focuses on relationship of sleep and recovery on a performance in National Team Athletes in Canada.

So, lots to get thru today, we are going to get to all sorts of stuff, particularly on some very practical things that you can use to improve your own sleep, sleep in clients, patients, athletes etc.

So we will be talking about circuiting biology, exposure to daylight in the day, how that influences your sleep, we are looking at sleep on daily basis, weekly averages, banking sleep, understanding what good quality sleep is and a whole lot of other stuff. So the show notes to this episode will be over at sigmanutrition.com/episode209 there are link up to today show, a place where you can get a transcript to today's episode as well as you can contact Dr. Bender if you wish. So that's all shown into the page and with

that, let's get into today's episode with Dr. Amy Bender.

Amy welcome to the podcast, thank you so much for joining me today.

AMY BENDER: Thanks for having me I'm excited to be here.

DANNY LENNON: I'm super excited for this one because as we know one of my real passions, one of the all aspects around health and performance that I am most polished about happens to be sleep, proper sleep and how that affects circadian rhythms and so on which will get into. So I'm super excited for this particular episode.

Before we get into some of the specific stuff around sleep and we are definitely going to dive into some practical things too. Maybe can you give people an insight into both your research interests as well as some of the work you've done with people and specifically athletes in this area too?

AMY BENDER: Sure. Yes. So I got my Masters in PhD at Washington State University and working at a world renowned sleep research facility, and there I didn't work with athletes at that point but I kind of gained the fundamentals of sleep and circadian in biology and then for my post doc I have been here in Calgary at the Center for sleep in human performance and University of Calgary for just over 2 ½ years now and I have been exclusively working with athletes and been working a number of Team Canada athletes and worked with few teams here and recently did a validation study of our athletes sleep screening questionnaire and over 200.. Well I guess technically 199 Canadian National Team athletes. We worked with different types of athletes but we certainly hope a number of the Canadian National Team Athletes.

DANNY LENNON: And also we will definitely dive into the things that you mentioned there, as I mention in the outset, I am definitely keen onto what are the practicality around sleep that people can take away. But before we do so, just maybe as a good starting point when it comes to a related area, although quite beyond just thinking

about say sleep quantity, and thinking of sleep as a system for rest if we tie that into a much larger area of circadian rhythms and how, say light and dark exposure influences that and that the role of circadian rhythms in human health. Obviously it is such a vast..vast area of super importance, but for people listening, what are some of the fundamental first few things to know about the concepts of light – dark cycle, circadian rhythms, one of the things that serve well for the rest of the conversation.

AMY BENDER: Yeah. So basically we have 2 main processes that regulate our sleep wake activities, we have the homeostatic process which basically means the longer you have been awake the more likely you would want to sleep. Sleep pressure, but then we also have circadian rhythm which means about a day, so our circadian rhythms typically or about 24 hours the majority of people have circadian rhythms longer than 24 hours. And so circadian rhythms, they are independent prior sleep-wake activity, and so there are fluctuations; natural fluctuations and alertness and sleepiness across the 24 hour a day and so those 2 main processes helps regulate our sleep-wake cycles. Just to kind of give you an example: so in my graduate work, I worked 62 hours sleep deprivation studies, so we would have participants go without sleep for 62 hours (cross talk 00:08:52) full night.. yeah 2 full nights of sleep, and so what was interesting to me, I mean just getting started into the field, I always thought about sleep pressure, you know the more that they have been awake, the more they are likely want to sleep. But I didn't quite realized the impact of the circadian rhythm and so it was interesting to me that on say our 60; they are alert as they can be.. part of it is just excitement of being able to go to sleep. But part of that is also due to this circadian rhythm, you know.. it's just 8pm, the high level alertness. And so when you compare that to let's say hour 48 or so, they were more alert at that 60 mark compare to other times of day when they are not sleep deprived.

DANNY LENNON: Yeah that's super interesting. If we are thinking about like concept of the sleep pressure that goes up to longer we are awake as one kind of thing that may influence Sleepiness then going to sleep and also the separate process of circadian rhythm and an example

that you just gave there Amy is this difference in alertness that is separate from how long he has been awake. Would that be, or maybe some people have experienced themselves some point in life where they are used to going to sleep on a regular time at night and then suddenly they don't go to bed and stay up a bit longer then suddenly an hour or 2 later they become more alert than before at 10 pm than they usually sleep and that they are more alert at 11 or 12 afterwards despite being awake longer because they have an unusual bedtime that makes sense.

AMY BENDER: Yes. Certainly, you can override that initial level of sleepiness. So if you are used to going to bed at 10 pm, your melatonin starts to get release prior to that time and 2 hours before bed. Melatonin is our sleepiness hormones, so as darkness sets in, our melatonin starts to get released and for the most part, I would say that probably light is the greatest regulator of the circadian rhythm. So in the instance where someone stays up later.. 2 hours later, it is likely that that light exposure is kind of reducing that melatonin so it's not making them sleepy then it could take a while to get back into that routine and get back to where you would normally be sleepy.

DANNY LENNON: Yes, I think that whole area of artificial light or exposed to blue light; looking at screens late at night has it effect on suppressing melatonin and therefore circadian rhythm and sleep has been talking about and people are starting to be aware. But previously one of the areas which I know you talked quite a lot about that, maybe isn't as prevalent amongst people minds is that the importance of limiting some of that blue light right before bed or in evening time, the importance of being within the day. Can you maybe touch on some of that for us?

AMY BENDER: There has been some research that came out showing that total light exposure across the day is important and actually one study showed people who were exposed to light before noon. So for example.. took a 20 minute walk outside or instead of doing your running on the treadmill, you do that outside – showed that they have better sleep quality so the more light exposure you can get before noon, the better your sleep quality is going be. And recently, there was

a study that I glanced over it, came out within the last 2 weeks, showing that light exposure during the day helps mimicate exposures from the devices right before bedtime. So the more light exposure you get across the day, the less that those electronic devices are going to reduce your melatonin at night.

DANNY LENNON: One thing I want to ask about is you just mentioned sleep quality there, how should we think about there or how should we define that idea of sleep quality. What exactly is good quality sleep?

AMY BENDER: That's a great question. Recently, the National Sleep Foundation came up with a definition of what good quality sleep is, and what they determined was that you are in bed sleeping for greater than 85% of the time so if I'm in bed for 10 hours I would be sleeping for 8.5 hours let's say, and that making sure you are not waking up no more than 1 time per night.

Our biology, we do actually wake up even as much as let's say 15 times per hour for a normal adult but it is very brief, it could be less than 5 seconds and certainly not remember it, but from their definition being remembering their awakening for 1 or less awakening is considered a good sleep quality and that making sure that that awakening is less than 20 minutes in duration. So they did a nice job, it's kind of being a question mark I guess on our field as to what actually good quality sleep is but they did a very good job of defining that objectively and then in our research, we find using athletes sleep screening questionnaire, the biggest predictor of sleep difficulty is actually the question: How satisfied are you with the quality of your sleep?

So, for those who are not satisfied, it is kind of a red flag for us..something must be going on, maybe there is an underlying sleep disorder, maybe they are having trouble falling asleep. So that is a very important predictor in the research that we are doing.

DANNY LENNON: I definitely want to ask you some assessment in just a while but while we are on the idea of sleep quality, presumably we can't separate those 2 ideas because whatever sleep quantity we get is kind of to some degree, not could be optimum quality or as good or

vice versa.. you get good quality but might not be sufficient quantity. What do the current evidence suggest the amount of optimum amount of sleep for people to get because obviously we get this 8 hour thing is what most people have in their mind. How accurate is that and what would you put as current best evidence recommendations based around sleep quantity?

AMY BENDER: Great question. So there is a lot of individual variability in the amount of sleep that we need. However, for a normal healthy adult, the recommendation is between 7 and 9 hours of sleep per night and for athletes, we think that we need more so we are shooting more towards that 8 hour range because of the mental and physical.. just the mental load and physical load that you put on an athlete's body can require more recovery time. So we think athletes certainly need more sleep and there is a number less than 1 percent of the population who can get by on the 6 hour or less of sleep per night. So there are a number of people out there who are thinking " I only need 6 hours.. I'm fine" but in reality, there is a very, very small percentage that you could actually get by on less sleep. So your brain kind of resets itself to this new set point, but you are still not performing optimally if you are getting into that 7 to 9 hour range, and the range is quite large, it is a bit difficult to figure out within that range of what is optimal for me. But I think some good signs of getting enough sleep would be waking up without an alarm clock, not needing copious amount of caffeine throughout the day to try and keep you awake, you are alert throughout the day.

It is a good sign that you would get that quantity and that the quality is also important. And I know you touched on the relation between quality and quantity, and I say it all the time in my presentations to the athlete.. you know I could tell you to get 9 hrs of sleep per night but if you are not getting good quality sleep, if you have underlying sleep disorder, you know, that is not going to be useful for you.

So you have to make sure you are getting good quality sleep. That you get help if you potentially underlying sleep disorder and then you can work on increasing the quantity.

DANNY LENNON: Right. While we are on sleep quantity, one of the interesting things that I've seen you touched on previously is that I don't think I have seen too much or elsewhere at least one people discussing about quantity. Is the idea of getting athlete to look at quantity in terms of their daily average of the course for a week as supposed to having be zero focused on every single day being perfect. Can you maybe touch on some of that idea of looking at the average over the week versus the daily number?

AMY BENDER: Certainly, it is important when you think about quantity, to think of it across an entire week. So there maybe days where we tried to get a good night sleep but something happened or we may be stressed out sp may not get enough sleep as we normally need. And so trying to make up for that lost sleep across the week, and certainly incorporating MAPS into the picture as well, will help erase some of that sleep that is occurred across the week.

So for example, you know for shooting for that 8 hour mark. 8 x 7 days a week = 56 hours across the week, we can then, maybe shoot for 7 hours a night, and if we don't reach that 7 hour mark trying to incorporate but then make up for some of that, then also incorporate maybe an hour nap to get that total you need across the week.

We need to be flexible with athlete's schedules and even just normal population if we can try and think of it in terms of that really sleep need, its more easily attainable.

DANNY LENNON: So if someone has a poor night sleep, and you can essentially make up for that by having more sleep throughout the rest of the week or catching up with naps and catch up periods of sleep. Can we also do that in reverse, like no one knows when it's going to be the time of sleep on that certain night or no sleep. Can they proactively start to lead up to more on that particular day?

AMY BENDER: Absolutely. So that is one of our main strategies for athletes is, if you know you are going into a competition and you may not get the best quality or

quantity of sleep, can you sleep bank sleep ahead of time prior to make up for that lost sleep. And the research showed that; if you bank sleep for just even a week, your performance is going to be better during that sleep restriction period than if you just want to get your normal ritual amount of sleep. So it is certainly a good strategy for athletes sleeping out for a competition, and then also even if you are going into big trips; so if you anticipate jetlag occurring, crossing multiple time zones, trying to get good sleep leading to that departure is really important rather than pulling that all nighter packing.

DANNY LENNON: That was just a huge concept for me to come across when I heard you discussing around banking sleep and how that actually going to offset persons performance, because me, on a very personal note, if I be similar to many other athletes that it is kind of a strange irony that more we know about the importance of sleep and certain knowledge can become a burden and also with me having this anxiety about make sure the night before the competition or important training session that sleep should be perfect and if anything disrupts that, then that leads to more anxiety which again being the irony of being more lacking of sleep becomes poor. So having this option of being able to bank sleep and knowing that, at least for a certain degree one night of poor sleep is going to be the end of the world if you will be able to bank some and lead up to it. I think that may be at least for me, I have been able to decrease some anxiety around sleep and time when I know it's going to be important.

AMY BENDER: Absolutely, So we know athletes, that night before competition, they are probably aren't getting a good of a night's sleep that they would like, and even if you know you are doing an iron man competition or marathon, it is obvious that you are going to be getting up much earlier than you would want to. And so we tell athletes all the time if you can just bank that sleep leading into it, you are going to perform better and it helps ease some of that anxiety to you.

DANNY LENNON: Yes and in addition to that anxiety, not to mention the travel; athletes go to the hotel or to another different environment, these also can affect sleep and I think

even our friend Ian Dunican and colleagues, they have recently done work looking at some athletes during weigh-in where potentially the weight cutting process, the week of the competition before the weigh in can influence sleep as well. So it's another strategy and a way maybe we can see banking of this can allow for some of that disruption to get on the week on the competition. It is so interesting.

Moving from there, one thing that you had just touched on was that some of the questionnaires from the athletes. For many people listening from the audience, there will be coaches, nutritionist, health and fitness professional, physicians working with different clients and patients and athletes as well. What would you recommend as the best way for them to assess sleep in their clients or if they go thru things that they should be doing and try to get a good picture of the sleep in their clients?

AMY BENDER: Sure. Yeah, so if you are working with any athletes out there, we recently submitted for a publication where we are waiting back for a review or comment but we submitted an athlete's screening questionnaire and the clinical validation of that and so definitely keep an eye on this article, because it's going to.. what the questionnaire does is it flags people, it's not a questionnaire to diagnose athletes with sleep disorder, but it's a questionnaire designed to flag athletes when there is a problem when they need to get further help. The questionnaire classifies the athletes into no, mild, moderate and severe, and those who are moderate and severe need further help and in the publication we go into the details as to if you have no clinical problem, we know you still need sleep education and it's not like we just let them go and they still would benefit from sleep education. And then those in the mild sleep category will need sleep education and then monitoring and those in their moderate, depending on their specific problem, they need help in the local sleep clinic in their area or other interventions in the same thing with severe. So definitely keep an eye out on this publication because I think it's going to help the athlete community into figuring out who needs further help because the current questionnaires used tend to over identify athletes who need help, so that's one option.

I think for just the general population, are they satisfied with the quality of their sleep? That question in itself we find is really important for identifying those who need further help.

And then just try to track their quantity, so if you have athletes or general population; track when they are going to bed; when they wake up, and then calculate that sleep duration in across the week, that is really important. There are some devices out there that you can use to track and like fit bits and even the Garmin watches have that kind of a sleep tracking piece. But they are not super accurate and they could actually lead to more anxiety if someone sees that they look at their watch, normally they thought they had a good night sleep then they look at their watch and they see that it was a very poor night sleep and that could impact just their level of alertness throughout the day based on not even the objective part but just seeing that feedback and what we know from the research is that these devices are not very accurate. So you kind of take them with the grain of salt and I think what is better would be to just either track it online thru a sleep diary even a paper sleep diary that you fill out each evening and morning to track how much sleep you are getting. And have more that a mood or alertness piece goes along way – that to see that you are getting more sleep I want to see more alert throughout the day, I'm in a better mood, and to really kind of given that feedback is important to develop these good habits.

DANNY LENNON: Yeah. I'm really glad you bring that up it actually touches on something I was going to ask about we are looking at different matrix on the track coz honestly with all the at least seemingly objective things we can track right now with different measurements like you mentioned, some of the accuracy maybe questionable but at least people try to put hard numbers on some things, try to consolidate that with not just looking at those things but the real value in that subjective markers like how fresh someone feels or how they felt when they performed that day etc. what do you think?

AMY BENDER: Exactly. I think so. I think there is this recent new research coming out showing that subjective sleep –

so it is not just about subjective, so there is also a subjective piece. There is a study where they told people "oh you got this amount of sleep" when they actually didn't and they actually performed better by hearing that type of feedbacks. I think this whole subjective feedback and thinking about your sleep in a good light can be beneficial.

DANNY LENNON: It is interesting to see from the parallels and research around recovery and stress and readiness doing different activities seems again the subjective markers prove to be just as important, in many cases, more important than some of the objective that some people are banking. So it is interesting to see that.

Just to move slightly from there, one thing that is interesting to ask, one thing that I particularly looked at and I don't know if there is much out there is obviously when it comes to the sleep environment we can set up within the room, there's core fundamental stuff around sleep hygiene but some on those specifics, do you typically give advice to athletes on things like best type of mattress or pillows to use or is there even any recommendations out there of there is good or bad types of bed clothing to use or is that been bad at all?

AMY BENDER: Very, very minimally. So I think the more important thing about mattress is 1) being comfortable because if I have a really hard mattress that could have impact on my sleep at night if I don't find that it is comfortable. Other than that, making sure that there is breathability so athletes tend to overheat at night, so make sure that the mattress is breathable, the pillows and the fabric are breathable.

In addition, there was a little bit of research showing that even a firmer mattress that you ended up getting a little bit more slow aid sleep or deep stage of sleep where our tissues are being repaired, growth hormone is released which is really important for athletes. So if the mattress is comfortable and its breathable and then if you go more maybe on the firmer side, that maybe beneficial for athletes but honestly there is not a lot of research in that area and so the big take away is making sure that it is comfortable and the mattress

itself is not that impacting to sleep at night or the pillows.

DANNY LENNON: Thanks for that. You mentioned about slow wave sleep, can you maybe talk a bit more about some of the different kinds of phases of sleep and what do we know about if there is any kind of optimal ratio of this different phases? What are we looking for to take in mind some of the different course in taking different types of phases?

AMY BENDER: We go through this both NON REM and REM sleeps throughout the night. So NON REM – non rapid eye movement sleep and REM sleep is rapid eye movement sleep.

There are 4 stages that we go through across the night. We have: Stage 1 – which is the lightest stage of sleep. Stage 2 and stage 2 non rem sleep which takes up about 50% of our sleep time across the entire night and then we would go into the deepest stage of sleep – stage 3 or slow wave sleep and that's very important for athletes for growth hormone is being released as I mentioned and that slow wave sleep typically occurs from the first half of the night and so once we get into the later half of the night, we will get into more on that REM sleep. And so we go thru NON REM and REM sleep in those type of cycle occur roughly about 90 minutes although it is not perfect, and we have a number of cycles that occur throughout the night; typically 5 to 8 cycles of non REM and REM cycles occur throughout the night and we can't really control the distribution of stages across the night. Athletes want to try and increase the slow wave sleep as much as they can and also making sure that they are not cutting off their sleep in the morning toward would not get on their last REM period. But it is very difficult to control those type of things, control the distribution of stages and I have seen a little bit of research telling that for example increasing fiber intake will help you get that slow wave sleep. So there is certain things, and exercise itself, actually gives us more slow wave sleep.

A number of different things that we can do to try and promote some of that slow wave sleep but on the

grand scale of staying in the grand scheme of things, it is a very, very, very small effect.

DANNY LENNON: Yeah. Perfect. Thanks for that roundup Amy. One thing that I want to ask about is that comes up all the time when people are discussing sleep and hearing problem of people who do fit work and obviously with many of the athletes that are high level that you work with is a problem because they could not focus on being an athlete etc. but maybe it does affect many amateur I think there are listening to this that are doing some sort of shift work or even beyond that just general population.

And so when it comes to a shift work, are there any clear recommendations of those type of things that people can do to mitigate the obvious circadian disruption that they are going to occur from this kind of change in sleep wave cycles. What or is there anything you found to be most useful in terms of people in that predicament?

AMY BENDER: Yeah. It is so challenging you know, because our bodies are not designed to be awake during the middle of the night but obviously there is about 20% of the population who do shift work and so we have to think of strategy in order to help mitigate some of those effects and there is a strong relationship between shift work and metabolic disorders and there has been a recent stuff from Australia showing that, trying not to eat large meals during your shift is really important during those trying to make a snack and not continually snacking throughout the shift but limiting those more on a fasting window, making a large fasting window so that you are not continually snacking and you are not eating large meals throughout your shift is important, light exposure is a good tool as well but it could kind of depends on how alert you need to be, so if I am wearing blue blocking glasses during my night shift, obviously I'm not going to be alert as if I'm getting a full light exposure in the eyes. So that's a little bit tricky. But certainly on a drive home, there has been some strategies to wear sunglasses to try and limit some of that light exposure so that once you get home and you want to sleep during the day that you are not wide awake and alert but obviously you need to be safe as well.

It is very challenging which shift to work but it's trying to play with the light exposure and play with a little bit of the eating can be important. And once you do get off that shift making sure that your sleeping environment is what you would be at night so having blackout shades, wearing an eye masks, making sure that there is not a lot of noise because there are people who awake during the day so maybe use a white noise machine can be beneficial. And then once you do get up from that sleep during the day, getting light, taking a walk outside to try and help you be alert would be important.

DANNY LENNON: Awesome Amy that is a brilliant roundup. Maybe just even to recap on some of that because I think there is so much value in the first thing you said around potentially using a fasting window during a night shift and so are we talking about something say someone is now working from 8pm to 8am of the night shift maybe have something on the first few hours of shift then decide from let's say midnight thru the 6am I'm not going to eat because at typical time we are not eating anyway and then have something next afterwards is one example of one could set that up.

AMY BENDER: Yes (cross talk 00:40:22) I think that would be a great idea and that's what I'm finding to be beneficial because our bodies are not designed to digest food in the middle of the night. So increasing that fasting window as much as you can and certainly eating early on during the shift and then maybe just if you can until that morning part and then if you need to then just maybe have a small snack in between and it is very beneficial because our bodies are not designed to digest food in the middle of the night.

There is something that came to my mind with shift workers as well. So trying to shift your window, one of the early strategy that sleep searchers would recommend would be to kind of continually be on night shift schedule but that's not very realistic coz we all have families and the post offices opens in the day and not at night so, one of the compromised strategies is that to try to shift more on that night owl and if you can, even on your days off stay up a little bit later and try and sleep in as late as you can to try and

compromise your circadian rhythm and be more than night owl type of person. It is the kind of a thing that they are recommending.

Danny Lennon: Right so we are trying to as much as practical keep the sleeping week cycle very lightly regulated. And what we can practically do is a complete opposite in terms of our sleep time and wake time compared to usual.

AMY BENDER: Yes. So for example, you are just getting off that night shift then you don't have anymore night shifts for a few days maybe instead of sleeping that full 6 hour chunk during the day maybe just take a 3 hour nap so that you will be able to easily fall asleep at night and you would normally, if you are not working the shift, say you normally get to bed at 10 pm to try and shift that a little bit, so maybe compromise, go to bed at midnight and then, instead of normally waking up at 6am, sleep in until 8 am if you can and try to make that midnight to 8 am kind of permanent on your days off if possible to help be more consistent in your sleep schedule as much as you can.

DANNY LENNON: Perfect. One thing before we end is when we are asked about melatonin supplementation because this tends to get brought up on people when discussing things like adjusting their body clock after travelling to different time zones, night shift workers as well. However, please correct me if I'm wrong, from what I have seen so far, that doesn't seem to be all that much just being a pro supplement for people not being able to know this mismatch circadian rhythm scenario. Would that be an accurate or inaccurate summary where it may or may not be useful, that could be useful in those scenarios.. the time zones, jetlag, or night shift but just for someone who is sleeping or awaking at some time is probably not going to do so much per se?

AMY BENDER: Exactly. The melatonin has been shown to be a good chrono biotics so it trains to shift you to be more of an evening type or even trying to get you go to bed earlier. In situations for jetlag for example or if in some of our athletes who are more evening types and they have training very early, we would recommend melatonin 2 hrs before their desired bedtime to help shift them and their circadian rhythm. But as a

hypnotic, melatonin does not really do much. So if you are using it to try to make you fall asleep, there are certainly better techniques out there including cognitive behavioral therapy which you can find on programs online or to be useful than taking melatonin.

And there is such melatonin is not widely regulated so there is such variability in the content that you don't know what you are getting. So that is another important thing to consider.

DANNY LENNON: And one of the attractive thing about supplementation is that it is seen as an easy fix people tend to, a lot of time ask for supplements to help them sleep (crosstalk 00: 45:58) on that question, do you feel right now that there are any supplements that are good and based on recommendations, one example that people most asked about is that magnesium is a good supplement for sleep although I think it doesn't nourish you like melatonin seems to be a lot of seeing that is going to help for most people with some sort of deficiency going on. Are there any supplements you feel right now to improve sleep?

AMY BENDER: The one that comes to mind actually is tartaric juice. Though tartaric juice is showing that it will help with the production of melatonin and help even a recent study came out in insomniacs so those having problems going to sleep or falling asleep and waking up in the middle of the night that tartaric juice is beneficial in those people and I think in athletes, it helps as well not only the melatonin but the reduction in inflammation that's occurring and so we don't come out and say " we use tartaric juice" but I think it is starting to become a worthwhile supplement to look into.

DANNY LENNON: Super interesting. Thanks for that. I'm keen to wrapping things up and take a lot at the time. Before I do it, I have one final question about napping, we touched R and R and more specific. Anything we should know about timing in terms of one amount of nap time is better than others, how long should people aim for, how long should we woken up? Is there any rules for napping if people are going to engage on that?

AMY BENDER: Sure. Napping is super important. It is important for athletes, it's important for the general population if you are able to take even a 15-20 minute nap, a power nap has been shown to increase levels of alertness, boost mood, even in those people who are getting a good amount of sleep at night, the naps are shown to be more beneficial for them as well as far as with regard to productivity and alertness etc., napping is important. We recommend about a 20 minute nap, so you would set your alarm for about 30 minutes and then if your alarm goes off, if you wake up before your alarm, certainly get up and the timing of the nap is important as well, you don't want to nap too close to bed time so aiming for between noon and 4pm is a good kind of range. And then for those athletes or for those people who may not be getting enough sleep at night, for example a swimmer who have has to get up at 5 am is likely they are not able to get enough sleep at night, extending that nap to no more than 2 hours is important for them to make up some of that lost sleep at night.

DANNY LENNON: This has been great Amy. Where can people find you online? Find out about the work you are doing, contact you on social media…that type of thing. What is the best place to find you on the internet?

AMY BENDER: I am pretty active on twitter you can find me at sleep 4 sport and I'm starting to get in to instagram and then hopefully have a few publications coming out that people can watch out for.

DANNY LENNON: And I will link all that to our notes so please do follow Amy online and also the links to one of our topics that we have discussed.

And that brings us to our final question that we always end on the show. It can be outside of today's topic or it may be related, if you can advise people to do one thing each day that would have a positive impact to any area of their life, what would that one thing be?

AMY BENDER: I guess I would say trying to get that light exposure. Not being stuck in your office all day, making sure that you are taking a walk outside and if you have an

opportunity to exercise outside, I think that is important and instead of maybe on the treadmill type of thing. So yeah, trying to get that light exposure I think that will lead to better sleep quality, and also mitigate the effects of electronic devices at night as well.

DANNY LENNON: And purely from my personal point of view, I'm glad you mentioned that because of all the things that we need to do sleep over the recent years, the last study showed a definite impact on putting more exposure to daylight and even beyond that for day somebody get stuck in the office and buying a blue light box. And having that pop on I know I will be getting stuck inside. And just that combination I have been aware of like early on it has made a tremendous difference. I'm delighted you actually said that (laughs) as a recommendation (crosstalk 00:52:05) and AMY this has been an absolute pleasure, I love talking about this stuff, being absolutely amazing, hearing from you first hand after looking on some of the work that you have done and put it out online and be able to see the super interesting things I found useful from your work. Thank you so much 1) for taking the time off and for the great information. I really enjoyed this.

AMY BENDER: Thank you so much Danny, thanks for having me.