34| NAN Foundation Brain Health Mini-Series: Sleep

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Speakers: Ryan Van Patten, John Bellone

Intro Music 00:00

Ryan Van Patten 00:17

Welcome, everyone, to Navigating Neuropsychology: A voyage into the depths of the brain and behavior. I'm Ryan Van Patten...

John Bellone 00:24

...and I'm John Bellone. Today we're going to bring you a very different kind of episode. Ryan and I are quite proud and excited to tell you about our NAN Foundation partnership. For those of you who might not know, NAN stands for the National Academy of Neuropsychology. NAN has a foundation, appropriately named the NAN Foundation, and the goal of this organization is to promote neuro-wellness through education. So they often fund different educational activities and programs. Along those lines, they asked us if we would create a podcast that would be targeted at the general public about brain health and how to maximize our cognitive abilities both now and as we age. Ryan and I feel that it is incredibly important for us as neuropsychologists and scientists to communicate our knowledge to the public. There is so much misinformation out there, and we believe it is our job to add an empirical, rational voice to the conversation. So we started out with three episodes: one on sleep, one on nutrition, and one on physical activity. The episodes are 15 to 20 minutes long, and there is no prior knowledge that's needed to access this information. These are meant to be part of a larger series that will be completed in the near future, but this is an initial foray into the partnership with the NAN Foundation.

Ryan Van Patten 01:53

Right, like a pilot miniseries. So we will be bringing you the first of the three episodes today as our NavNeuro episode. We think this is relevant for our NavNeuro listenership for several reasons. First, we have a large student listenership, which we think could benefit from hearing this information. Second, for those of you who are further along in your training, even seasoned neuropsychologists, one use of these short 15 to 20 minute audios that we are excited about is that they could go in the recommendation sections of our reports. It's pretty common for neuropsych feedback to be related to brain health. I know I'm talking to patients about that all the time. So, if you listen, and you think this is good, high-quality material about improving sleep, nutrition, and exercise, then you could simply add a link in your report to the NAN Foundation website that has these audio files. Then your patients could go listen and get more information on how to improve their health in these ways. So you could dovetail, or add, to augment what you give them in feedback.

John Bellone 03:10

Even if it's not in the report, you can have a separate sheet that you give them in case they're interested in the podcast.

Ryan Van Patten 03:16
Exactly.

John Bellone 03:17
It adds more if you're going to talk about some of these tenants. For physical activity, for example, you might tell them that exercise is good for our brain and for reducing the risk of cognitive decline in the future. It's great in the moment, but the repetition is really helpful - hearing it a number of different ways, hearing why it's helpful. The mechanisms underlying cardiovascular...

Ryan Van Patten 03:39
In feedback, you probably don't have 20 minutes on sleep, 20 minutes on diet, and 20 minutes on exercise.

John Bellone 03:44
[laughs]

Ryan Van Patten 03:44
You can farm some of that out if you think it's high-quality. We are very interested in feedback and your thoughts about the quality of these episodes. So if you listen to them, as a neuropsychologist, and you have pointers or comments feel free to email us at feedback@navneuro.com and send us your comments. We'd love to hear them.

John Bellone 04:05
We're going to link to the main page on the NAN Foundation website, which is a beautiful page that has got all three of the audio episodes embedded there.

Ryan Van Patten 04:15
You say it's a beautiful page - is that because your picture is on it?

John Bellone 04:18
Of course.

Ryan Van Patten 04:18
Your headshot? It could be beautiful-er if we made a few slight adjustments, John. Just saying. [laughs]

John Bellone 04:25
[laughs] No, no, they did a great job. We didn't have anything to do with the website creation. They did a great job, the NAN Foundation. So we will link to that in our NavNeuro episode. You can go to navneuro.com to get the link there or just go to the NAN Foundation website, you could just type that into Google. So today is our episode on sleep through the NAN Foundation and then the next two months on the 15th we are going to bring you the next two episodes - nutrition and physical activity. So you can look forward to listening to those as well.

Ryan Van Patten 04:55
So January 15 will be nutrition, and February 15 will be exercise.

John Bellone 04:59
Yep.

Ryan Van Patten 05:00
Great.

John Bellone 05:00
Well, we're really excited to bring you these.

Ryan Van Patten 05:02
Yeah. So without further ado, here is NAN Foundation episode one.

Transition Music 05:06

John Bellone 05:11
Welcome to the NAN Foundation podcast, a brain health miniseries. We're your hosts Dr. John Bellone and Dr. Ryan Van Patten.

Ryan Van Patten 05:33
Imagine that you go to the doctor, and she prescribes you a new medication. This medication reduces your risk of cancer, the flu, obesity, diabetes, stroke, heart disease, and Alzheimer's disease dementia. It improves your mental health, reducing your risk of anxiety and depression. And it also enhances your current thinking and memory. All with zero side effects. In other words, you live a longer,

healthier life. You might think this magic elixir is too good to be true. If it were somehow true, it would be worth more than gold and you'd probably have to mortgage your home or sell your car simply to afford it. But then your physician tells you that this medication is actually available for free to everyone. John, would you believe her?

John Bellone 06:25
Well, this doctor sounds like she either believes in magic or she is secretly trying to sell me something.

Ryan Van Patten 06:30
[laughs] In most instances, you'd be right. However, there is something that truly does provide all of these health benefits and more. It's not a drug. It is simply a good night's sleep.

John Bellone 06:42
Yeah, I'm pretty busy with my full time job and podcasts, can I just sleep when I'm dead? What's wrong with that?

Ryan Van Patten 06:48
Well, you can, but then you'd be sleeping sooner than you'd like to be. [laughs]

John Bellone 06:54
[laughs]

Ryan Van Patten 06:55
In the past few decades, the science on the health effects of sleep has grown immensely and it all points in the same direction. Sleep is absolutely essential for good health. It's incredibly restorative for both our bodies and our minds. The National Sleep Foundation recommends 7 to 9 hours of sleep per night for most adults. Younger adults and children tend to need more sleep, and older adults need a little bit less. So if that's how much sleep we need, how much are we getting on average?

John Bellone 07:27
Unfortunately, not nearly enough. There is a so-called "sleep epidemic" where two-thirds of adults are not getting the sleep they need each night. What's more, there has been a strong trend towards less and less sleep across time in this

post-World War II industrialized world. For example, according to Gallup polls, in 1942, American adults reported getting about 8 hours of sleep per night, which is within those recommended guidelines, but that number has dropped to the point where we currently report less than 7 hours of sleep per night. Remember that this is an average, which means that many people are getting fewer than 7 hours. These people, unfortunately, tend to be sicker, they die younger, they struggle with physical and mental illnesses at a greater rate than do people who sleep longer. The idea of sacrificing sleep during the week, and then making it up on the weekend, which is sometimes called "social jetlag", does not solve the problem. What we need is a consistent 8 hours of sleep, not 5 or 6 hours during the week and then 9 or 10 on the weekends.

Ryan Van Patten 08:30

We cannot stress enough just how important sleep is to overall health and quality of life. One way to think about this is that wakefulness, the time we're not sleeping, is really taxing and stressful on our brains. It can even be thought of as low-level brain damage. Sufficient sleep is the one remedy, in that it acts like a reboot of a computer or an oil change for your car. The machine, which is the brain in this analogy, was running poorly before the intervention. But after you apply the treatment, the clutter is out of the way and it can function effectively and efficiently again. In this manner, sleep can be thought of as taking out the trash of the brain.

John Bellone 09:13

If you're convinced that this is true, you may be wondering how to go about improving your sleep. One thing I will say, just right off the bat is, it is very helpful to give yourself a non-negotiable 8 hours of sleep each night. We're going to certainly say more about the methods to improve sleep in a bit, but first we should give an overview of the basics of sleep so that we have a common understanding from which to move forward.

Ryan Van Patten 09:39

To get started, there are two basic types of sleep: rapid eye movement, or REM, and non-rapid eye movement, or non-REM. Within the non-REM, we have stages 1 through 4, where stage 1 is lightest and stage 4 is deepest. We progress through these stages in a stepwise fashion each night, and we complete one full cycle from light to deep sleep in about 90 minutes.

John Bellone 10:06

So while we're in deep non-REM sleep, stages 3 and 4, as well as REM sleep, our brains are undergoing important health promoting mechanisms. The trash is being taken out, so to speak. It's also crucial for improving memory for information that you learned the day before and to prepare your brain to learn new information the next day. It's important to remember that these effects are present for everyone, no matter who you are. It doesn't matter how intelligent you are, how resilient you are, or what your genetic profile is, we are all susceptible to the maladies of poor sleep. It's crazy how people brag about how little sleep they get, and society has this perception of people being lazy if they sleep in too long. You can think of the teenager that sleeps till noon...

Ryan Van Patten 10:49

...or the podcast co-host who doesn't respond to emails before 10:30am.

John Bellone 10:52

[laughs] Exactly. I need my beauty sleep and clearly it's working quite well.

Ryan Van Patten 10:56

That's debatable. [laughs] Actually, though, there are real genetic differences between so-called "morning birds" and "night owls". So, that truly is a legitimate concept. Even a single night of poor sleep has an impact. If you sleep for 4 hours on a particular night, your brain will not be functioning at its maximum capacity the next day. You'll be less alert and sharp and your reaction times will be slower. So, you'll be more likely to get into a car accident, you won't remember as many of your experiences from that day, and you'll make more errors at work. And, importantly, there'll be a number of biological processes going on inside that worsen your health over time.

There are two concepts that are really important to understand in this context. Bear with us here, it's going to get a bit technical for a couple minutes, but it's well worth it. In our brains, there are two separate but interrelated drivers of sleep. The first is called "Process S" and it's based on the fact that our bodies have a drive to maintain a balanced internal state. So, you can think of “S” for “sleep-wake balance”. This is the feeling of sleepiness that we experience when we have not slept as much as we need to. That's the typical way of thinking about sleep. "I only slept for 5 hours last night, so I'm especially tired today. Sleepiness has built up for me over the course of the day."

John Bellone 12:24

However, Process S is not alone. There's a second equally important sleep-regulating mechanism in the brain called "Process C". Process C refers to one of our daily biological rhythms, our drive to sleep. It's closely linked to cues in the environment, predominantly sunlight. There is even a region of the brain that acts like a biological clock, regulated by the sun. So Process C - and you can think of “C” as in “clock” - also helps explain why when people stay up all night, they feel more and more sleepy until the early morning hours when then they start to actually feel a bit more alert. They haven't slept, so why are they more awake than they were a few hours ago? The answer is that sunlight is registered by the brain, which then implements mechanisms to increase alertness and arousal.

Ryan Van Patten 13:11

So Process S and Process C both regulate our day-night sleep cycle. The key to being healthy is to keep these two mechanisms linked together so that they work in synchrony to promote wakefulness and tiredness at the appropriate times. In other words, be awake during the day and sleep at night. It's pretty simple. Unfortunately, they are often out of sync. This is most evident for people who either work the night shift or are jet lagged.

John Bellone 13:41

So, what's happening here is that you're throwing off Process S, the sleep-wake balance, and C, the clock. Imagine that you work in a factory from 10pm to 7am each night, and you're trying to sleep during the day. Process C is telling you to fall asleep at about 10pm, just about the time when you're starting to work; while Process S is telling you to sleep at around 10am because that's the time when your job allows you to sleep. These forces are now working against each other and the result is often disrupted, interrupted, non-restorative daytime sleep that leads to a laundry list of problematic health conditions like the ones we mentioned at the beginning.

Ryan Van Patten 14:21

And jet lag works in a similar fashion. When you fly across the country, you're hopping across time zones very quickly. Far too quickly for your brain to adjust to the new schedule of the sun. The further you fly in the east-west or west-east direction, the worse the effect will be. We all know about the drowsiness and trouble sleeping that results for a few days following this kind of air travel, jet lag, but many people don't know about its detrimental long-term effects, especially if this happens on a regular basis.

John Bellone 14:54

We'll get into sleep interventions in just a minute, but, for now, let's turn our attention to a few common sleep disorders. One of the most common sleep disorders is insomnia. Insomnia is characterized by a dissatisfaction with sleep quantity or quality, with trouble initiating or maintaining sleep, and/or with early morning awakenings. In other words, the person has the opportunity to sleep, but they're not able to do so to their satisfaction. The hallmark of insomnia is anxiety, arousal, and activation. Your body's revved up, kind of like a car engine, and this state is not compatible with sleep. In order to fall asleep and stay asleep, we need to be in a state of comfort and relaxation. This is why people find it so difficult to sleep if they are nervous about something. When the mind is busy, the brain can't rest.

Ryan Van Patten 15:46

Sleep apnea is another common disorder, and it occurs when a person stops breathing repeatedly during a sleep cycle. It's associated with loud snoring and feeling fatigued during the day, even after what seems to be a full night's rest. Sleep apnea is associated with a host of health problems, including heart disease, type 2 diabetes, and cognitive impairment, among others. There are two primary ways in which sleep apnea negatively impacts the brain, so thinking and memory. The first is through a decrease in oxygen, where the brain is deprived of fuel. The second is through the disruption of restorative sleep, which as we have mentioned, is really critical for brain health. Fortunately for people with sleep apnea, there's a device called a CPAP, which stands for continuous positive airway pressure, and it's simply a wonderful treatment. If it's fitted properly and used regularly, the CPAP allows the person to receive constant oxygen throughout their sleep cycles.

John Bellone 16:51

In addition to sleep disorders there are also external threats to restorative sleep. We've already mentioned two of these: shift work and travel across time zones. We'll also talk about three others that have a big impact on modern society. The first one is alcohol. Although alcohol can help us fall asleep initially, it fragments our sleep and thereby lowers the overall quality. It especially targets REM, which is incredibly important for thinking skills. So, as with many things, it is best to use alcohol in moderation, and heavy drinking should not be used as a sleep aid.

Ryan Van Patten 17:25

Second is caffeine. Caffeine works by blocking a chemical that causes healthy drowsiness. Now, moderate, occasional caffeine intake in the mid- to late- morning

can be an effective way to promote wakefulness and improve our performance. However, caffeine stays in our bodies for many hours. Therefore, we do not recommend consuming caffeine in the afternoon or evening as it's likely to interfere with restful sleep.

John Bellone 17:52

And third is blue light. Based on Process C, we need exposure to light during the day in order to remain alert and sharp; however, our sleep cycle can become disrupted through exposure to light in the evening - it can throw off that clock. There are different wavelengths of light, and light at the blue end of the spectrum has a greater impact on sleep than the light at the red end of the spectrum. Unfortunately, frequently used electronics, such as computer monitors, tablets, and smartphones produce a significant amount of light in that blue end of the spectrum. Energy efficient LED lights also produce high concentrations of blue light. In order to combat this problem, you want to expose yourself to a large amount of light during the daytime. The best way to do this is to spend time outside because the sun is by far the best light producing stimulus in our environment. Don't forget your sunscreen, of course. You also want to minimize your exposure to blue light in the evening. There are lots of good products on the market these days that will block the blue wavelengths on your devices.

Ryan Van Patten 18:52

There are also a few other harmful effects of using devices, primarily smartphones, at night. One is called “sleep procrastination”, where we feel tired but we have trouble disconnecting from our phones or computers, and so we put off sleep in order to check email, post to Facebook, etc. In this case, your phone is disrupting your sleep and so it's reducing your health. The best recommendation in this regard is to simply put some space between yourself and your phone in the evenings. Shut it down for a few hours before bed and make it a point to avoid checking it at night or right when you first wake up. The long term benefits to your health will be so immense that I guarantee your future self will be thanking your current self dearly for making this decision.

John Bellone 19:41

Since we're now talking about recommendations to improve sleep, let's transition into treatments to improve sleep quality and duration. So, first and foremost, it's important to remember that sleep itself is an intervention. Some people use prescription medications to facilitate better sleep. We're not going to go into all the ins and outs of these drugs, but the takeaway here is that, although they can

sometimes be helpful in the short term, these drugs have problematic side effects and many can lead to dependency and addiction. So they're not the ideal treatments.

Ryan Van Patten 20:12

However, the best treatment for insomnia and low sleep quality is behavioral in nature. It's about changing your habits and bedtime routines. This sometimes goes by the name of cognitive behavioral therapy for insomnia or CBTI. It's also called “sleep hygiene”. Think about dental hygiene - it's very important to brush and floss your teeth regularly or else you'll likely be faced with cavities and gum disease. Similarly, there are a set of recommendations to improve your sleep hygiene. These recommendations have been shown time and time again by researchers to enhance our health and well being. The overall goal here is to make your bedroom and your bed itself a strong cue for your brain to sleep. You want your body to associate the bed with sleep, and not with worrying or planning or watching TV. John, why don't you run through these specific recommendations for us?

John Bellone 21:14

Sure, and I want to reiterate that these recommendations are based on strong scientific evidence. If you have trouble sleeping, and you employ some of these strategies and give them a few weeks to a few months, you'll notice a major change most likely. So, number one, don't use your bed or bedroom for anything other than sleep and sex. Again, because you want your body to associate the bed with sleep. Also keep the bedroom cool, dark, and quiet. Make sure you go to bed only when you're sleepy and if you don't fall asleep within the first 15 to 20 minutes, get out of bed and do something restful in another room. Then go back to bed only when you feel sleepy again. If you don't fall asleep within 20 minutes on returning to bed, repeat the process as many times as needed. Clock watching is not recommended so hide the clock, just estimate the 20 minutes. Again, this is not the time for worrying or planning out your day. Number four, use your alarm to get out of bed at the same time each morning regardless of the amount of sleep that you got so that your body gets used to getting up at that later time. And make sure you avoid caffeine in the afternoon and avoid heavy alcohol use as well.

Ryan Van Patten 22:28

Before we wrap up today, I'd like to add one more thought. As we mentioned earlier, children and teenagers need even more sleep than do adults. Yet, like many adults, a lot of them are underslept. One factor driving this phenomenon is the move towards earlier and earlier start times for schools. Some teens go to bed at

midnight and wake up at 5am for school. Then they're expected to sit in class and soak in new information all day long. In this sleep-deprived state, their brains are simply not equipped to learn new information. Think of a sponge that is saturated with water, it cannot soak up anything else at this point. Even if it means fewer total hours in school each day, the time spent in class will be so much more efficient that the teen is likely to recoup the lost time and more. In other words, they can spend less time in class and still learn more because their brains are actually rested and prepared to learn.

John Bellone 23:29

So, to wrap up, we'll give you three action steps that you can do right now to improve your sleep and your overall health. Number one, make sleep a priority and give yourself a non-negotiable 8 hours of sleep. Everything else should be built around this 8 hours. If you regularly snore and/or you are tired despite sleeping 7 to 9 hours, talk with your doctor about possibly getting a sleep study to rule out any sleep disorders. And three, if you have insomnia, request a therapist who will work specifically on your sleep, for example by using that CBTI technique Ryan mentioned earlier.

Ryan Van Patten 24:04

Well, that's it for today. Join us next time as we continue to promote neuro-wellness through education.

Exit Music 24:10

John Bellone 24:33

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Ryan Van Patten 24:43

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