Alan Hu Foundation Mental Health Lecture Series

Sleep in Adolescents: An Early and Potentially Modifiable Warning Sign
Webinar by Lauren Asarnow, PhD

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December 7, 2021

Welcome everyone to the Alan Hu Foundation Mental Health Lecture Series. I'm Chih-Ching Hu, Co-Founder of Alan Hu Foundation and the host for your webinar. Today, Dr. Lauren Asarnow will present Sleep In Adolescence: An Early and Potentially Modifiable Warning Sign. Before moving forward, I would like to thank you all for joining us across the country and around the world. I would also like to thank the Mental Health Association for Chinese communities for providing simultaneous Chinese interpretation. Thank you MHACC Founder and President Elaine Peng, and thank you, Ida Shaw for the Chinese interpretation. The Alan Hu Foundation Mental Health Lecture Series aims to make mental health knowledge common knowledge. The Alan Hu Foundation's mission is to promote mental health, raise awareness, and remove stigma surrounding psychiatric disorders, and support fundamental research for cures. Please consider making a gift to Alan Hu Foundation. Your gift will be 100% invested into the foundation's mission to support mental health. Today, it is my great honor and privilege to introduce Dr. Lauren Asarnow. Dr. Asarnow is an assistant professor of psychiatry at the University of California San Francisco. Dr. Asarnow's research program, Child and Adolescent Behavioral Sleep Medicine, aims to reduce the burden of mental illness in youth by developing behavioral interventions that are effective, youth-friendly, engaging, widely disseminable, and easily accessible. Dr. Asarnow's publications are, Sleep and The Mood Disorders Among Youth, and Sleep in Youth With Repeated Harm and High Suicidality: Does Sleep Predict Self-Harm Risk?

She received the NARSAD Young Investigator Award from the Brain and Behavior Research Foundation, and Access to Care Award from the Klingenstein Third Generation Foundation, to name a few. In today's webinar, Dr. Asarnow is going to discuss sleep as a potential target for intervention in the prevention and treatment of mental and physical health problems.

Following the presentation there will be a Q&A session. Please submit your questions using the zoom Q&A function. This presentation is for educational purposes only and is not intended for medical diagnosis. If you have any persistent symptoms, please seek professional help. With that, I'm going to turn to Dr. Asarnow. Dr. Asarnow I'm going to stop sharing now.

Okay great!

Well, I want to start by thanking the Alan Hu Foundation for inviting me to give this talk. It's an honor and I will go ahead and share my screen now. Make sure it's coming up.

Yes, I can see it.

Okay, so I want to start off by dedicating this talk to my beautiful cousin Emily, who passed away in 2009 due to suicide. She is an inspiration to me and she was one of the major reasons I got involved in this work in the first place, and a reminder to all of us how not every suicide is preventable, even though we try our very best. But, I carry her with me always in the work that I do. So moving on.

Anyone who's been in a classroom or anywhere else where you see large swaths of adolescents has seen a figure like this. And indeed, the estimates are that 45% to 70% of adolescents have some sort of sleep disturbance that can cause something like this. The question is why is it so high among adolescents? What's going on?

And there are a number of different ways to just measure or describe the sleep difficulties that this young woman might be experiencing. Some are short sleep duration, so not getting enough sleep, daytime sleepiness, falling asleep in class, poor sleep quality at night, and insomnia, which is defined as a difficulty initiating or maintaining sleep, these are all really common sleep complaints that have been relatively well researched and are associated with cross-sectional and long-term adverse outcomes. In my view, one contributor to the burden that's particularly important when talking about adolescent development is something called circadian preference. So this is an example of a circadian cycle down along the x-axis; you'll see the time of day. This individual is what we might consider sort of the average circadian person. They're getting up at like 7 a.m., going to bed around 11 p.m. So in the United States this would be considered an intermediate circadian rhythm, so this person in blue, turning up is sort of green on our screen, is more of an early morning person and they're typically waking up closer to 5 a.m. going to bed at 9:00 p.m. Now something interesting happens that's been documented. Documented by a researcher named Mary Carskadon from Brown, she noted that with the progression and onset of puberty adolescents tend to prefer a delay in bedtime. Her group has shown that this actually has a biological basis and is characteristic of healthy development, and estimates are that between 30 and 40 percent of teens will have this delay in circadian preferences. However, what's interesting, even though we do consider it part of normal or typical development, we also see that it's associated often with worse academic outcomes and more depression and anxiety. And we think it is a consequence of this, right, so if you have a delayed bedtime preference and you just can't fall asleep earlier, even if you try, and then you have to wake up early for school you have this restricted sleep time which causes all sorts of issues. Right, so if you're trying really, really, really hard to sleep while you're in bed and your body just can't, you're going to develop insomnia. It's going to make you more stressed out both about lying in bed, not being able to sleep, but also about not getting enough sleep for the following day.

So, I'm going to just pause here for a minute and kind of back up and talk a little bit about what a circadian rhythm is. So a circadian rhythm. Circadian means around a day, but slightly longer. So most people's circadian rhythm ticks away at like 24.5 hours per day, so that means that every morning your body has to re-entrain or re-sync to a 24-hour cycle. Let's look at what might happen. So they did these studies many many years ago, which we can't do anymore, but they put a bunch of participants in rooms that were sealed off from light and social activity and things like that. So for the first 21 days you can see that the participants had regular access to sunlight. And you can see they kind of went to bed, and stayed asleep, and got up at the same time every day. Then, you'll see, circled in red here, on day 22, they decided to close the door. There was no more sunlight, and they had no alarm clocks, or watches, so they really had no idea what time it was outside. And you can see what happened. Without that light, participants drifted later and later and later, and pretty soon they were going to bed, you know, during the day and waking up at night. So circadian entrainment is actually quite an important thing for us, and there are a number of different circadian inputs that help us entrain our bodies. So, number one here is light, and we'll be talking quite a bit about that. Other ones are social interaction, eating, and then physical activity. All of these cues in our environment help us know hey, it's daytime or hey, it's nighttime, time to go to bed.

So now we're going to focus a little bit on light. So when thinking about how to utilize light to sort of entrain your circadian rhythm and keep it regular, you want to have bright light upon awakening. You want to have natural light exposure throughout the day because that would indicate to your body hey, it's daytime, and you want to have dim light exposure as bedtime approaches, because if you think about it out in nature, that's sort of what would happen right now. Where I am, it's at 6:30 at night, and there wouldn't be this bright light over my head; it would just be the moonlight and the stars outside, and then you have a dimmer limited light at night. And limited electronic exposure as bedtime approaches, as well.

So, melatonin is an important hormone that is secreted by the pineal gland and it helps regulate your circadian rhythm. Melatonin is inhibited by light and permitted by darkness, so as darkness approaches your body starts to produce melatonin in the three to five hours before it anticipates darkness or before your usual bedtime.

And light, like I'm experiencing right now, bright light would actually inhibit melatonin production for me, and so that's part of the rationale for why we want to keep dim light in the evening hours. And melatonin promotes sleepiness; it's a hormone that promotes sleepiness. And so, I think one of the questions that came through from the Hu foundation is that a lot of people have questions about taking melatonin. Taking melatonin can be a really good option for some teenagers, with a few caveats. So, for adolescents taking melatonin, it sometimes stops working around the age of puberty. It works really well for young children. It helps promote sleep on set really quickly with young children, but sometimes for adolescents it doesn't work that well. So for that reason we want to keep the doses as low as possible. So if you find that you get to a dose of three milligrams, that's okay, and if that helps promote sleepiness, that's okay, but if you start going into like 10 milligrams, you may actually be doing more harm to your sleep than good. So that's just something to keep in mind when you're thinking about melatonin. The other thing about supplementing with melatonin, it helps an individual with sleep onset, then in the middle of the night it won't really be helping, so they have a control release formulation of melatonin now. So if you're a person that wakes up a lot in the middle of the night, that's an option to pursue. For adults melatonin doesn't tend to work as well, so I tend to try to shy away from it. We also use melatonin sometimes to adjust people's circadian rhythm, but that's a much more complicated story. So, if you're having questions about that, it's probably best to talk to a sleep specialist about that.

So darkness is a really powerful cue that triggers a cascade of biology, including the release of melatonin, that will help you fall asleep. So exposure to darkness actually turns out to be a very, very important thing. Not just avoiding light, but just exposure to darkness. So consider not turning on major lights if you get up in the middle of the night. If you have just a lot of computer lights in your sleeping area, consider trying to block them so that they don't go kind of straight into your eyes and expose you to that, and activate your circadian rhythm. So another circadian zeitgeber, we call them circadian cues for entrainment, is social interaction. So how can we use this to our advantage to kind of entrain circadian rhythm? So social interaction upon awakening would kind of indicate to you, hey, time to wake up, and so that can be a really great way. So talking on the phone with a friend or a loved one, if it's a teenager finding a way to have meaningful social interaction that's not too irritable or cranky in the mornings, can be really, really good social interaction. Exposure throughout the day is a great way to activate that circadian entrainment. Less stimulating social interaction as bedtime approaches, and especially you want to kind of limit social media as bedtime approaches, because it is that combination of activating light from a device. And this very stimulating type of social interaction. And then, of course, you want to limit social interaction in the middle of the night, because that would indicate to your body, hey, time to wake up.

So another circadian cue is food. So feeding time should be regular and scheduled throughout the day as much as possible that helps regulate the circadian rhythm. You want to limit nighttime eating or drinking unless there's some medically important reason to do so. And no eating in bed, that would be another piece.

And physical activity is the last circadian cue we'll talk about here. So physical activity upon awakening is a great way to get up in the morning and tell your body hey, time to wake up. So we sometimes recommend doing sit-ups, push-ups, jumping jacks, whatever you can in the morning to get your body moving. And you want to have regular physical activity throughout the day to keep your body activated and awake. You want to limit physical activity as nighttime approaches, so the traditional idea, here, at least in the United States, is that we sort of after 7pm, we don't want to be doing too much physical exertion. Too much, you know, real physical activity, like running, things like that. And then, obviously, in the middle of the night you want to limit physical activity. So if you wake up in the middle of the night, it's not a great time to do yoga, or take a jog, or better time to kind of be sedentary.

So another important component of circadian regulation is just sleep timing. So as you can see here, down along the x-axis, it goes from three here on the left to 29 here on the right, and then on the y-axis here is time. So 9 p.m down at the bottom and 9 a.m at the top, and you can see in black here is the weekend sleep schedule and blue here is the weekday. And what happens around adolescence, wow, those blue bars and those black bars

are not super aligned, so you can see that teenagers tend to sleep at different hours on the weekend versus the weekdays. Which makes sense, because on the weekends that's their time to kind of be more in line with their circadian biology. They don't have to wake up early for school, right. However, if you think about it, this is like flying from San Francisco to New York every week. So if somebody goes, if a kid wakes up at 7:00 a.m. during the week and then wakes up at 10 a.m. on the weekend, that's a three-hour time difference. That's the same as between California and New York. And for those of us who have done that trip, that would be hard to do every week. That's hard on your biology, and so that feeling of being jet-lagged is also a big reason why that teen that we saw in that initial photo is probably feeling not so great. Feeling like their body starts to feel sort of out of whack. So another thing about changing your time zones from weekend to weekday, is that it doesn't give you an opportunity to build up what we call sleep pressure. So you guys are getting the crash course on sleep, so I'm looking forward to questions at the end if this is too much all at once. So the sleep drive is sometimes sort of similar to the hunger drive, right. After you have breakfast in the morning, your hunger's pretty low and as lunch time approaches your hunger is going to increase and then you're going to eat. And then, your hunger will decrease again. So it's similar to sleep. When you wake up in the morning, your sleep needs are pretty low. This person's at a one, but as the day progresses, your sleep need increases and increases and increases until you get to sort of a critical pressure point, and this person's sleep need is a 10, right. Then they have bedtime, they go to sleep, and their sleep need decreases again, right. I sometimes liken this to a balloon, so if you blow up a balloon really big and you let go, it makes this beautiful sound and that's the sound of your body falling asleep easily. But, if you blow up your balloon sort of halfway, it makes a pathetic kind of sound, and that is the sound of your body not being able to fall asleep. So, in other words, you need a big enough sleep balloon to be able to fall asleep well.

Certain things interfere with your sleep pressure. So you can imagine this person took a nap in the middle of the day, that's this green line, right. So they take a nap in the middle of the day and that decreases their sleep pressure, right. They don't have a high sleep need at this hour, maybe 3 p.m., but then at their usual bedtime their sleep need isn't going to be high enough. They're going to have to go much later to get a high sleep and need to be able to fall asleep and stay asleep easily. So, and another factor to consider for this for teenagers, is let's say that this person woke up instead of waking up at 7 a.m. on the weekend they woke up at 10 a.m. and so their line would sort of start here and you could see that at their usual bedtime they wouldn't have as enough sleep pressure to fall asleep. And this is kind of the Sunday night effect that we often see in teenagers, right. They wake up at 10 a.m. on Sunday morning and then Sunday night when bedtime approaches at 11:30 p.m. they can't fall asleep. They just don't have enough sleep pressure, and so then they stay up late. Lying in bed, trying to fall asleep, eventually fall asleep, waking up in the morning totally sleep deprived, and feeling terrible. They'll come home, maybe take a nap in the afternoon, and then the cycle sort of perpetuates itself. So that's also another factor to think about. But, how do you know how big your sleep balloon needs to be? So these are sort of rough guidelines from the National Sleep Foundation. So you can see here, teenagers fall between their sleep needs, which is between eight and a half and nine and a quarter hours. I would say that the big caveat to that, is that there's a ton of individual variability. Some teenagers really only need seven and a half hours and some need nine and a half hours. There's a lot of variability. Another thing to think about is there are certain times in all of our lives when we need more or less sleep. When we're sick, we need more sleep, because our body needs time to recuperate, right. When we fall in love, we don't need as much sleep. So there are these certain periods in our lives where we may need more or less sleep, or sleep needs might differ. So that's also important to consider. So determining how big your balloon needs to be can partially be based on these numbers. But another thing that it can be based on is your own body cues, and that's that feeling of being sleepy. So in this slide we have the difference between being tired. Tired is not the same as being sleepy.

And I don't know how this will translate in Mandarin, so I'll be very curious, but colloquially we use the two interchangeably, very commonly right. But in fact, there are real differences. If you think about being tired, that's the feeling of like you're physically tired, right. You just took a long run or you had a really long day at work and you just want to sit down, but if you lie down and try to sleep you likely couldn't fall asleep. And a lot of people

make the mistake of trying to go to sleep when they feel tired, not when they feel sleepy. Feeling sleepy has certain physiological cues, so it's different for everybody. For me, my big telltale is I'll start to yawn. My eyes will sometimes start to tear. They feel heavy, you know. So, everyone has to kind of learn their own sleepiness cues. But those cues are then the thing that you wait for to go to bed, right. Is to make sure that your balloon, your sleep balloon, is big enough.

So one thing that can interfere with both sleep pressure and this idea of going to bed when you feel sleepy, is this issue that many teenagers face. Which is, they have their room right, and that's their private space, and the rest of the house is sort of communal, so they do everything in their room. And they do everything in their bed, and that can actually decrease sleep pressure. By lying down and spending a lot of time in your bed, that can decrease sleep pressure and that can make it hard to distinguish between that feeling of feeling tired and feeling sleepy. So information about sleep and sleep-incompatible behaviors, and day 10 consequences of sleep disturbance is often given to inform patients of some basic steps that they can do to improve their sleep.

Sleep hygiene education is typically included as part of the sleep treatment that we do, called Cognitive Behavioral Therapy for insomnia, and I think it's important to note that it's used as the only intervention in treating sleep problems. It has not been empirically supported, so it's an important component of all of these things we're talking about today. But this in and of itself is not going to solve all the problems. So sleep hygiene is sort of this idea that the bed should be for sleep only, and you want to stick to a sleep schedule even on weekends. Like we were talking about, you want to avoid that jet lag that goes along with the week day to weekend sleep changes. Exercise is great, but not too late in the day. A lot of these are going to sound familiar from the things I discussed earlier. You want to avoid caffeine and nicotine. So one cup of coffee, two cups of coffee, maybe three cups of coffee in the morning are fine. But we want to avoid it after a certain point in the day, because that's going to really decrease your sleep pressure. Avoiding alcoholic drinks before bed, so a common misconception about alcohol is that it helps you sleep, but it gives you really poor sleep quality. And then, it often actually wakes you up in the middle of the night because of the ways metabolized. Another thing is avoiding large meals and beverages late at night before going to bed, not taking naps after 3 p.m, and I would actually say 2 p.m. if possible, especially for night owls. You know evening circadian preference types and you want to keep power naps less than an hour, you also want to relax before bed. Some people like to take a hot bath before bed. Having a good sleep environment, which is getting rid of anything in your bedroom that might distract you from asleep. So, you know, not sleeping right in front of your computer screen. Don't lie in bed awake if you find yourself still awake after staying in bed for more than 20 minutes. You want to get up and do a relaxing activity until you feel sleepy. So this is one I think that a lot of people hear about, and so I want to just clarify a few things. So when we say 20 minutes that does not mean ever looking at the clock. So basically after you go to sleep for the night, you should never look at the clock until you wake up in the morning. An alarm clock is a really good thing, so you don't have to check the clock. So this is just what feels like 20 minutes, and I think for teenagers they can't adhere to this most of the time. They're not going to get out of bed and go do something in another room, so it can be just a modified version of this. Which is just kind of sitting up and reading a book or doing something relaxing in bed, in a different position than lying down. So another thing is adopting good sleeping postures, and seeing a doctor if you continue to have trouble sleeping. And that's a really, really important one. And many sleep problems can be fixed with a talk, like this, but many require the help of a medical professional. So that is always an option.

So another thing that teenagers and adults often do, in bed when trying to sleep, is worry. So when lying in bed some people worry about, you know, what they're gonna do the next day, did they add this to the to-do list. It's the time when all of a sudden people's brains turn on and they remember everything they need to do, or everything they did that day that they wish they hadn't. And then, a lot of times that can turn into worry about sleep itself. You know, I'm lying here in bed trying to sleep and I still can't sleep, and now I'm gonna have a terrible day tomorrow, and, you know, we've all been there. So one strategy that we often talk about, and the treatments I do, is this idea of scheduling a worry time. There are some worries that come up because you haven't given

them enough time to think about them, right. So it's kind of this idea of, you know. If you throw a bottle into the ocean, this idea that you're hoping, avoiding these thoughts, they'll just go away, but they always end up coming up to shore and that's what thoughts do, right. We can't avoid those things that we think and feel, so scheduling a time during the day. So preferably many hours before sleep, so I like for most teenagers, we end up anchoring it somewhere around dinner time. So either right before dinner time or right after dinner time, and taking 15 minutes to just think about the things that they're worried about. Write them down, do some constructive thinking about them. Some of them are probably problems you can solve and some of them are just feelings that you need to process. And so, that's a really helpful intervention for many folks, teens and adults alike.

So this slide is the different stages of sleep. I'm not gonna go into too much detail of them, but we're just kind of focused on these top two stages. So you can see, here, if we put EEG monitors on someone's head and measure their brain waves during sleep; this, or while they're awake, is roughly what their brain waves will look like. Now in stage one of sleep this is what their brain waves will start to look like and this is the preparation for sleep phase, so what's interesting about this is a few things. One, you can kind of notice that stage one looks pretty similar to awake in that, however, the waves just tend to get a little bit slower, right. That's essentially what your body needs to do to start to fall asleep. Just needs to slow down, your heart rate needs to kind of slow, your muscles need to relax, and you need to kind of let go, right. Another thing I find very interesting about this, is if I try to figure out exactly where this person fell asleep, it's almost impossible. We end up sort of having to guess or pair it with the visual of seeing the person fall asleep, indicating to me that sleep is not just a switch. And the other thing that's interesting is that stage one is a brain state that people who engage in regular meditation, mindfulness, prayerfulness often just hang out in. There, when you are in that kind of mindful, prayerful, meditative state, that is stage one. So if you can't sleep, hanging out in that sort of mindful, prayerful, meditative state is ,A, restorative, because it kind of gives you that stage of sleep. And B, a gateway possibly into stage one of sleep and then into deeper sleep. So that's one I find pretty interesting.

So I may have sort of blown this pop quiz, but here's a pop quiz. Is falling asleep more like A: a dimmer; B: flipping a light switch, or C: cranking up the volume on your phone. I think, yeah, we have a poll; I can launch this so people can join. Okay I can see it. Great! This is my first time doing it. All right. I'm gonna wait till we get a little bit closer, because it looks like some of you are still putting in your number. So we'll wait for just a few minutes. I'll have a couple sips of water. Okay. So, we have a lot here. It looks like approximately 75 of you are correct. It is more like a dimmer, so entering sleep is not just, you know, sleep from awake to sleep. It is that you have that kind of transient stage. That phase, that's stage one of sleep to go through, to fall asleep. And I think that's a good thing for folks to know, because sometimes we get stressed thinking. Ah, it's been five minutes; why can't I fall asleep. But sometimes, your body just needs some time. Oh, I guess I need to share the results, sorry. Can everyone see the results now? Yes. Thanks for doing that. That was fun.

So now we can play something similar. Sort of the wind down game, and these are from one of my sleep treatments that's video-based. So we talked about how falling asleep should be more like a dimmer than a switch, and that means people need some time to wind down. So teenagers tend to go from doing their homework, to getting in bed, and that's likely not gonna work. Especially when you combine it with that kind of night owl tendency. We need time to relax, unwind, allow our body and our mind to let go, so we typically recommend that between 30 and 60 minutes before bed you engage in some sort of quiet, calming, wind-down activities. And there's no right or wrong necessarily. However, there are some activities that are more conducive to winding down and there are some activities that are less conducive to winding down. So let's look at these. So these are some activities that some of these kids engage in before bed. So when listening to music, do we think it's green or red? So green is winding down, red would wind you up. Now most of the time I would say this is really dependent on what type of music you listen to. There is some music that is really activating. If you're listening to Metallica right before bed, I'm guessing it's not going to wind you down, but if you're listening to Chopin, or Yiruma, or something, maybe it will really help you kind of calm and wind down. Listening to calming music is a great activity to do to kind of wind down before bedtime. Reading a book is another one. It's a great activity

before bed, but if you are reading the greatest thriller and you can't put it down, that's not a good choice for winding down. It's a great activity to do on a, you know, Saturday or Sunday afternoon, but reading sort of a good book that's not too engaging or exciting is a great way to wind down. And especially using light. That's sort of in the back of your head. So not using a big overhead light to read, but rather just dimmer light. Or the lights on certain kindles or tablets can be pretty minimal, as well. So fighting with friends or parents, I'm going to say this is pretty solidly a winding up activity. So this is going to make you activated, excited. Probably makes it really hard for you to sleep that night, so those are the types of activities you want to avoid in the evening hours. And studying, although a lot of people will find it not that engaging or exciting, it is then even a little bit stressful. So it's not a great wind-down activity. It's sort of a wind-up activity. So we want to give space between studying and sleeping. So finding some activities that fit in there.

And another part of what we do is, Relaxation Therapy. So there's something called progressive muscle relaxation. So tensing and relaxing parts of your body, that can be a really great way to sort of prepare your body for sleep. It gives your mind something to do other than kind of wander and worry, and do the things that minds do. So some teenagers like to do activities, like savoring where they think about an event that they really enjoyed, and they think about all the details of that event and really savor it. That can be a really relaxing kind of mental activity, or, like I said, progressive muscle relaxation or breathing exercises. So there's a lot of different ways to do this.

What I love about sleep is that it's a domino effect. Well generally you're more likely to feel pretty good during the day and as you can see some of the skills that you learn in these treatments of sleeping, it's a relaxation, winding down, recognizing stressors, those types of things. If you can learn them and apply them to your sleep, you'll also learn them and apply them to other aspects of your life. So it's really beautiful in that way. And, one of the powerful things about sleep, also, is it's modifiable. It's one of the things I really enjoy working with sleep.

But we can also imagine that when sleep is not going well it has a lot of adverse consequences, which I think are very well discussed in the media, but I'll talk a little bit about some of them now. So there's an impact of sleep, inadequate sleep, on physical health. Studies indicate that there's a general susceptibility to illness that happens. You're three to four and a half times more susceptible to developing a cold. And you have a decreased immune response, including a vaccine response, when you're sleep deprived or not sleeping well. There's also metabolic differences. There's a correlation between having less sleep and having a higher BMI. Not getting enough sleep, and increased risk of diabetes, increased production of ghrelin, which is a hormone that indicates to your body that they're hungry, and decreased leptin, which is the hormone in your body that says, "hey we're full," don't be satiated. And I've actually done some work indicating that if you modify sleep, you can actually modify some of these eating preferences. That sleep-deprived kids tend to crave more what we call high glycemic index foods, so like more carbohydrates, more sugars. And if you modify sleep, if you improve their sleep, actually, we find that their eating preferences improve a bit too. Having poor sleep is also related to cardiovascular health, higher blood pressure, and increased risk for cardiovascular disease.

So daytime sleepiness and alertness are also associated with worse performance on memory, concentration, and attention tasks. You have decreased reaction times, worse working memory, increased errors on measures of vigilance, and poor performance on driving simulators. Stanford famously did this study where they had people either drive drunk or drive sleep deprived, and not sleep deprived like no sleep, but sleep deprived like five or six hours of sleep. And they found that actually the sleep-deprived drivers were worse drivers than the drunk drivers. Not that that's an advert, you know, obviously no one should ever drive drunk, but indicating that sleep deprivation really does have motor performance consequences. And you have a decreased physical ability, decreased endurance, increased fatigue. This is the reason why so many athletes really prioritize sleep. And there's obviously an impact of inadequate sleep on mental health. So short-term effects include irritability. Like I mentioned earlier, the sleep deprived teenager in the morning is not going to be a fun breakfast companion, and that is totally normal and it makes sense. As we all know, we've all experienced sleep deprivation. It's really

hard, everyone gets irritable. There's also emotional volatility, or ability that comes with being sleep deprived. It's much more difficult to regulate one's emotions when you're sleep deprived. You don't have as much access to your hippocampus at that point. It's just a lot of emotion, and not a lot of control. Sometimes we call it all gas and no breaks when you're sleep deprived.

The longer term effects, so we see a correlation between sleep problems and depression, and what's interesting is there's very high what we call comorbidity. So they go together a lot, but we also see that the sleep problems often predict and predate the depression problems. So that part of my research is looking at if we identify those problems early on and we fix those sleep problems, can we prevent the progression of depression and anxiety disorders? And my hope is very much so, yes. That would be great. Again, it makes sense if you're feeling anxious during the day, it's going to be a lot harder to wind down at night, and so those things really go very tightly together. And likewise, if you're having trouble sleeping at night, you're going to feel more anxious, more volatile during the day, less able to cope or function.

And then, important for this talk, is also that sleep is a one of the acute risk factors for suicide that we've identified. I think it's really important that if one is sleep deprived and experiencing those thoughts, that they talk to somebody and talk to a parent, a friend, a doctor, preferably as soon as possible.

So, in closing, we talked about a lot of things today. I'm just going to do a quick review for strategies for better sleep. So first, I think it's important, especially for parents, to know that adolescents tend to have a preference to go to bed later and get up later due to changes in their biology. And it is not their fault. Many times this is not something that they can control, but there are some things that we can do to kind of help with that. Attending just to regular circadian rhythm, and to all those circadian inputs, we talked about. Regularizing your sleep schedule can be really helpful, and making sure that one goes to bed when their sleep pressure is high, when you feel sleepy, not when you feel tired, will help maintain good sleep hygiene. So keeping the bed for just sleep and not for other things, avoiding caffeine, avoiding naps, avoiding alcohol, and nicotine, and then avoid worrying. In bed, those thoughts, worry thoughts, are gonna come up, though. One thought is to use this idea of a scheduled worry time, and falling asleep is more like a dimmer than a switch. So the hearty huge for high to sleep and to flip that switch, the further you're gonna get away from sleep. So allow yourself that time and allow yourself the space to kind of let go. And implementing a wind-down routine can really help with that process. And lastly, if you can't sleep and you're feeling distressed, please call your doctor and talk to them, because there are these behavioral strategies that can be used and can help a lot of folks.

So I know we covered a lot of things. So in order to sort of consolidate that learning, I always like to take a mindful moment at the end to reflect on one thing that you'd like to remember from today, that you think could be helpful. And then, I'd like to thank you all for having me. This is my team, my wonderful research collaborators, my mentors, and my funders. So thank you so much again to the Hu Foundation for having me.

Thank you so much, Dr. Asarnow for the wonderful webinar. Wonderful presentation. Thank you so much. I learned a lot. I'm gonna practice some of the skills to improve my sleep quality. Okay, so now we are open to Q&A.

Would you like me to stop sharing, or?

Oh it's okay, we can leave this page here. The first question coming from the audience is, can we get the slides after the speech? I think our foundation can answer that. This webinar is being recorded. We're going to put the entire webinar on the foundation's website, and also on YouTube. We're going to publish that a few days later, so you can always come back to check it out. So the next question is, my teenager can only sleep for about five hours at night, and wakes up by herself. No matter how early or late she sleeps, she falls asleep during the day. How can we lengthen the sleeping time for her?

Yeah, that's a really tough one. So without meeting your teenager it's hard to say, but oftentimes that is a symptom of anxiety. That they're just sort of pent up; they're anxious, and it's hard for them to wind down. Alternatively, there are people that are just genetic short sleepers, so if you have people in your family that just all need five hours of sleep contact UCSF because we have a research study on you, and it's possible that she's a short sleeper. It's less common than being stressed out, but it's also a possibility. So I guess my advice would be to sort of assess whether you think that she's really anxious, and if so have them talk to somebody about their anxiety and help them deal with that because being a teenager is really hard.

Okay, next question is, what would you say is a good relaxing activity, especially in the evening?

Yeah, it depends on your interests. I personally really love to read. A lot of my teen patients love those mindful coloring books, so they have these adult coloring brushes they love. A lot of teenagers like other crafts, like knitting. I have some kids that play music. I have some kids that take baths. There's no limit to the things that you can think of, but there are usually some lists online of great wind-down activities. So, you can look through those and I would say, the other thing I would encourage is, to try something new. Trying something new is actually a very relaxing, engaging activity.

Okay, we have some pre-submitted questions. One question is, is sleeping too much or too little a symptom of depression?

Yeah, that's a good question. So one of the diagnostic criteria for depression is sleeping too much or sleeping too little. Sleeping too much interestingly you would think would give you more energy, but often it doesn't actually drain your energy. Sometimes people who are depressed use sleep as a way to avoid the things that are difficult for them, during the day, social activity, or things they just don't feel like they have the energy to do. So that could be one of the things that happens. Sleeping too much and insomnia, or sleeping too little is another symptom of depression as well.

Another question is, if it's safe for teens to take a super sleep daily from over-the-counter webber naturals?

I believe it's some kind of melatonin. Yeah, I don't know that product specifically, so I would say that a lot of these kinds of herbal remedies are not innocuous. Some of them are fine, but anything that has like melatonin, or kind of like active ingredients that we know have issues, you want to be careful with the dosage of that. So anything with melatonin and other things you don't know the dose of. So it might be better to just take melatonin and know the dose, because as I was explaining earlier, having melatonin at too high a dose could actually make it worse. The other thing that we see a lot of for some reason, where we live in San Francisco, is that a lot of those supplements have a really high concentration of B6 and you can actually get B6 toxicity. And it can cause sleep problems, so that's another kind of bizarre thing. So my recommendation is always to kind of stick with what we know, what the research says works, which is melatonin at low doses.

Okay, the next question is, my foster child has experienced trauma when she was a baby and how does trauma affect sleep quality?
Yeah, that's such a good question. So gosh, I was just reading a paper the other day that it's somewhere between like 80 and 95 percent of individuals with PTSD experience have some sort of sleep problems. So a really common one is nightmares, but also just insomnia, in general poor sleep quality, so I think one of the things we need to be able to sleep, if you think about it, is to feel safe. Sleep is a very, very vulnerable period, and if you look at evolutionarily animals that are kind of higher on the food chain, like lions, they can sleep 20 hours a day, no problem. They're not scared. But animals that are lower on the food chain, you know like ourselves, we're relatively high in the food chain now out in the wild we would be lower, would be like seven or eight hours. Other animals are asleep for much shorter periods of time, so I think that's a big function of just fear of sleep ,and

fear of being vulnerable, is really challenging for individuals that have experienced trauma. Especially at a very young age. Another way that it can interfere with sleep, is that sometimes traumas happen at night and so there can be sort of a fear of the night time or fear of bed. So it's one thing to think about, and I think that's a really good place to seek professional help.

Yeah, next question. We know teens tend to sleep late, but how late is considered normal ? 12 am?

It's such a great question. I don't have an answer to it. I think that so many factors come into play. So just because it's normal doesn't mean it's going to be good for them. You know, during the summer, and if they really don't have to wake up for school or anything like that, it's better for them to keep their biological schedule. I do believe that evening types have a harder run in life because the world operates on a morning type schedule. And so, it's better to try to, if they have to live on a morning type of schedule, if they have to wake up at eight for school, it's better to kind of try to keep them regulated and as close to that schedule as possible. I don't know, but yeah, there is no answer to what is normal.

Okay. Next question. Is a sleeping problem treatable without medication for ADHD kids?

Yeah, I treat a lot of kids with ADHD with sleep problems and absolutely. There's no reason to think this sleep treatment, that we covered components of in this lecture, is applicable to kids with autism, ADHD, depression, anxiety, PTSD, and diabetes. Like it, we use it for all types of kids in different ways, so there's no reason that it couldn't be helpful to any type of kid that we know of yet.
Okay. So the next question is, many teenagers make up for their loss of sleep on the weekend. From your talk it sounds like this is not ideal, but is it better than being sleepy?
That's a good question. So. I like to say that there is no sleep piggy bank. There is no saving up for a rainy day; you can acquire sleep debt, but you can't acquire sleep credit. And I think it's a really hard thing to take, but if you think about it right for yourself, like, let's say, you had a really bad night and then you sleep 10 hours the next day, you're probably not going to actually feel any better. Sometimes you do, but sometimes you actually just feel worse because your schedule, your circadian rhythm, is then completely off. And so I'm a firm believer in the circadian rhythm and the importance of keeping it as regular as possible. And so sometimes that will come at the cost of sleep quantity.

Dr. Asarnow we are just over 7: 30. So, maybe we have one or two more questions.

Yeah, okay.

Next question is, do you have any suggestions for teenagers, young adults, who sleep totally at the opposite time? During day time, not because of job perhaps because of a mental health challenge?
Yeah, so this is unfortunately common in certain mood disorders, especially depression. Sometimes bipolar disorder, other types of psychiatric illnesses, and then also just sleep disorders. We call it an extreme delayed sleep phase or another circadian rhythm disorder. And I would recommend for those folks that you seek a sleep health professional, because those are problems that are not easily solved. There's usually a lot more going on. But all of that work that we talked about earlier, about regulating the circadian rhythm and making sure that all of those good daytime circadian cues are happening during our daytime as opposed to night time, is a good place to start. So, you know, making sure during the day they're getting lots of bright light, natural light, or you can use a light box, also can be helpful. Getting lots of social activity, having regular meal times, physical activity, those types of things can help quite a bit. But I do recommend seeing a sleep health professional for that.

Okay, how about the last question. What are good postures?

Firstly, that's such a good question. So, you know, I don't know. It depends on the sleep issues. So sometimes

people with something called Obstructive Sleep Apnea, which you may or may not have heard of, will have worse sleep when they're sleeping on their back. And so sleeping on their side is a better position for that. Not sleeping, or sitting up too much, you know.

Yeah, all right, awesome. Thanks Dr. Asarnow for the wonderful presentation and the Q&A. So we are closing the event. I want to also thank everyone for joining our webinar today. And stay tuned for our future webinars. I'm closing an event right now. Happy holidays to everyone, and stay safe and stay healthy.