Science Magazine Podcast

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Promo

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Music

Interviewer – Sarah Crespi

Finally today, Kelly Servick, news intern for *Science*NOW, is here to share some recent stories from our daily news site. I'm Sarah Crespi. So first up we have a story on the power of naps. Why we sleep is still kind of a deep mystery, and we know even less about sleeping in children. Most parents recognize the need for naps, but what are kids' brains doing during these extra down times? Okay, Kelly, so let's start with the inspiration for this study. I think it's really interesting how this study of preschooler naps came about.

Interviewee – Kelly Servick

Right. So the lead author on this study, Rebecca Spencer, actually has some preschoolers in her life and wanted to investigate whether these little brief naps that preschoolers get have the same memory-consolidating power that we know adult sleep has, and so she actually turned to her daughter's preschool and took a sample of the kids there to run her experiment.

Interviewer – Sarah Crespi

So I can't really imagine wrangling a bunch of preschoolers for a study, so what was the setup like here?

Interviewee – Kelly Servick

So they took 40 preschoolers almost 3 to almost 6 years old and they offered them a game to play so that probably helped, the sort of classic memory game where you see different pictures on cards and then you flip all the cards over and you have to remember which picture was under which card. So they taught all the kids this game and then they had them take a nap for about an hour and 15 minutes, and then when they woke up they had them play the game again and see how well they performed. The point of the study was actually to compare each child against him or herself. They repeated this whole experiment with the memory game the next day but none of the kids got to take a nap. And what they found was when they played the game right after the nap, they did about as well as they did before their nap. But when they played the game later in the day with no nap, on average their performance dropped by about 10%.

Interviewer – Sarah Crespi

Well, you know, I feel a little sharper after a nap sometimes. Is that a possible explanation for this?

Interviewee – Kelly Servick
Well, the other interesting thing they did was test the kids again the next day, so it would appear that these naps are actually having a more long-term effect on consolidating memory.

Interviewer – Sarah Crespi
So if they skipped the nap they didn't recover that ability to do it the next day.

Interviewee – Kelly Servick
It would appear that they didn't, although there is one caveat which is that the kids who were used to getting about five naps a week saw this decrease in their performance when they went without a nap, but the kids that were not so used to napping actually didn't show the same effect. So there's a possibility that as kids' brains develop and they don't need a nap anymore, it's not that important.

Interviewer – Sarah Crespi
So it sounds kind of like the kids might grow out of napping, but to kind of seal the deal here the researchers also took some of these kids into a sleep laboratory. What were the results there?

Interviewee – Kelly Servick
So 14 of the kids from this class went in the sleep lab and they examined their brain activity during their naps and they saw something called sleep spindles, which are these little bursts of brain activity that are known to be associated with memory processing. So that shows that there might be a real physiological basis for the memory changes that they saw.

Interviewer – Sarah Crespi
Okay. And so what's the takeaway from all of this? Don't stop napping?

Interviewee – Kelly Servick
Well, I think there is a concern that a lot of public preschools really aren't putting an emphasis on the nap, and this might be a hint that they don't just keep kids from being cranky later in the day, they might actually help their brains in a bigger way.

Interviewer – Sarah Crespi
Next up we have a story on antibiotic resistance. Antibiotic resistance arises when a microbe with a gene that conveys immunity to a drug begins to thrive and take over a population. That resistance is preserved and passed around making the antibiotic useless against the infection. And this has led to efforts in the medical community to change their prescribing practices but perhaps they haven't been going about that in the right way. What's the current practice here, Kelly?

Interviewee – Kelly Servick

Well, the current practice is to alternate the kinds of antibiotics that doctors prescribe with the hope that they can sort of reduce the chance that any one type of bacteria that's really resistant to a drug is going to predominate and cause a real problem for infections.

Interviewer – Sarah Crespi
So what about this idea of collateral sensitivity that's investigated here?

Interviewee – Kelly Servick
Yes, this is an interesting idea that these researchers in Denmark sort of explored using *E. coli*. They found that when *E. coli* gains resistance to one antibiotic, the changes that it makes also end up making it more vulnerable to some other antibiotics. That's what they call collateral sensitivity.

Interviewer – Sarah Crespi
And so what did they do to figure out whether this might be useful in the clinic?

Interviewee – Kelly Servick
So they took some *E. coli* strains and they exposed them to increasing doses of an antibiotic, and eventually all these different variations of the bacteria emerged. And then they exposed those different variations to, I think, 23 different other antibiotics and they saw whether they became more or less resistant. And using this sort of computer analysis they came up with 200 different drug combinations that you might be able to use to first sort of weaken the bacteria and then knock it out with a different antibiotic.

Interviewer – Sarah Crespi
So basically they are targeting resistant bacteria. Once that resistance arises they can knock them out with a second antibiotic.

Interviewee – Kelly Servick
That's right. And here's a little example of that is that sometimes a bacteria will develop this special kind of pump that will pump antibiotics out of the cell, but as soon as it has a pump it also can allow compounds to flow in. And so if there are other antibiotics that can use that pump to their advantage, then they're going to be the ones that you want to choose for treatment.

Interviewer – Sarah Crespi
So the big difference here is that instead of just alternating an antibiotic, you might actually choose a second antibiotic on purpose.

Interviewee – Kelly Servick
Right. The idea is that you need to be a lot more deliberate about the sequence of antibiotics. And the ones that they describe are either double, triple, or quadruple treatments in order to make sure that you're kind of getting the most out of the variation of antibiotics.

Interviewer – Sarah Crespi

Alright. So has this been tested in the wild, or in the hospital?

Interviewee – Kelly Servick
Unfortunately not in the wild yet. Only *E. coli in vitro*. So really the big test is going to be whether actual patients would benefit from this kind of treatment regimen.

Interviewer – Sarah Crespi
Finally, we have a story on water bridges. When I say water bridges you might think a bridge that goes over water, but we're actually talking about a bridge made of water. There's actually a really nice picture of this on the site. So, Kelly, can you start us out with what makes a water bridge?

Interviewee – Kelly Servick
Sure. So if you've got two beakers both full of water and you apply an electric voltage across them and then move them apart, this weird string of water kind of like a string of spit when you pull something away from a baby's mouth – but I suggest going to the *Science* news site to see the actual picture – this thing emerges but it doesn't fall, it just sort of stays there in the air and it seems like it's defying gravity.

Interviewer – Sarah Crespi
This penchant for water to bridge like this in the presence of electricity has been known about for a while.

Interviewee – Kelly Service
Right.

Interviewer – Sarah Crespi
But what's been the thinking up until now about the physics behind it?

Interviewee – Kelly Servick
There are a couple different theories about the physics. The first one was something called dielectric tension, which is where when you apply this voltage all the water molecules line up in this particular way and that keeps the bridge from falling. The other idea was just the plain old surface tension that's a property of water that a lot of us understand that allows water bugs to walk along the surface of water on this sort of tendency of water molecules to cohere together. So that was the other idea, that the bridge was being held up because the surface of water wants to sort of shrink inwards.

Interviewer – Sarah Crespi
We're talking about this because the debate has been resolved, right? What's actually going on?

Interviewee – Kelly Servick
Yes, they think they've figured it out, and actually those two forces that I just described apparently are splitting the task 50/50 and they're sort of sharing the weight of holding this bridge up.

Interviewer – Sarah Crespi
So besides resolving a longstanding debate, what is this information useful for?

Interviewee – Kelly Servick
So surprisingly this is not a pointless experiment because you could someday see this technology in the next generation of e-book readers. The idea is that the same forces that keep these bridges aloft could also help to develop this technique of electrowetting where you can sort of change how fluids adhere to a screen to make a more advanced e-book reader screen, so they say.

Interviewer – Sarah Crespi
Okay. Well, what else is on the site this week, Kelly?

Interviewee – Kelly Servick
So we also have a story about some evidence that some marine creatures have two different internal clocks, and also some evidence that Venice might not actually be sinking, or that parts of it might not – and we have a really cool map to sort of illustrate that. And then on *Science*Insider, our policy blog, coverage of Angela Merkel's victory in the German elections and the political challenges she faces particularly around nuclear energy policy. And then this week's *Science*Live, our weekly live chat, will be about exploring the mysteries of the teen brain with our neuroscience writer Emily Underwood. And next week, October 3rd, also at 3 p.m., Maria Cruz will be discussing some new findings from the Curiosity rover. So be sure to check out all this stuff on the *Science* news website.

Interviewer – Sarah Crespi
Thanks, Kelly.

Interviewee – Kelly Servick
Thank you, Sarah.

Interviewer – Sarah Crespi
Kelly Servick is a news intern for *Science's* daily news site, *Science*NOW. I'm Sarah Crespi. You can check out the latest news, and the policy blog at *Science*Insider, at news.sciencemag.org, where you can also join a live chat, *Science*Live, on the hottest science topics every Thursday at 3 p.m. U.S. Eastern time.