

PLOS Science Wednesday: Hi reddit, we're Dorothee Fischer and David Lombardi, in our recent PLOS ONE study we show why adolescents have a hard time waking up early – they're the latest chronotype – Ask Us Anything!

PLOSScienceWednesday¹ and r/Science AMAs¹

¹Affiliation not available

April 17, 2023

Abstract

EDIT: David Lombardi will not be joining today's chat. Hi Reddit, My name is Dorothee Fischer and I am a Postdoctoral Research Fellow at Harvard T.H. Chan School of Public Health. My research focuses on how to design shift schedules that minimize risks for health and safety using the fact that people sleep and function optimally at very different times of day (they're different chronotypes). My coauthor, David Lombardi, will be joining me for today's chat. We recently published a study paper titled "Chronotypes in the US - influence of age and sex" in PLOS ONE. In this study, we found that there are large differences in chronotype among individuals at any age (from 15 to over 80) and that chronotype differs systematically by age such that on average adolescents aged 17-19 are the latest chronotypes in society making it hard for many high school students to accommodate early school start times. If you want to know more, Ask Us Anything at 1pm ET!

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Hi Reddit,

My name is Dorothee Fischer and I am a Postdoctoral Research Fellow at Harvard T.H. Chan School of Public Health. My research focuses on how to design shift schedules that minimize risks for health and safety using the fact that people sleep and function optimally at very different times of day (they're different chronotypes). My coauthor, David Lombardi, will be joining me for today's chat.

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What is the best method to switch from a late sleeping schedule to an early one? Or would that be counter-instinctive and bad for my health?

[Syssleback](#)

There are certain ways to change how early or late you are, but there are also certain limits to how much you can shift in a given environment. Light and darkness are the most dominant cues that the internal circadian clock uses to synchronize to the 24h day. If you want to get onto an earlier sleep-wake schedule try exposing yourself to a lot of light the first 4h after you wake up (go outside or try a light box) and avoid light as soon as the sun sets. You can use software for your phone, laptop, etc. that blocks out the blue light, you can use sun glasses, etc.

Hello and thanks for the AMA as well as publishing with PLOS. I'm a secondary science teacher so it's always lovely to have access to papers my students can check out...especially when it's clearly relevant to something they care a lot about!

School start times are also relevant to me. I find it disturbing that schools claim to be obsessed with data collection and research based best practices, yet when it comes to something as important as

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sleep for developing learner brains, there's huge resistance to change. I realize that some of it is simple inertia and that there are a zillion interlocking parts that make a district's schedule work, but right now it feels like we're at the "never gonna happen" stage.

As teachers we want our students to learn to develop political awareness and get active in their community. How do you think teachers and researchers like yourselves can work together to help students create awareness of sleep-related research so that perhaps we can see a shift in schedules that takes your research into account?

Edit: I'm from a town that had one of the first recycling programs in the country, and regardless of whether recycling was saving the world or saving money, promotion among students at school truly changed behaviors in the community as students brought their knowledge and practices home. I feel like the same could potentially be true of sleep and chronotype awareness.

[Maskirovka](#)

Dear Maskirovka,

Thank you for your interest on our research! I agree with you, it is sometimes very frustrating to see how slow change can be. In our studies, we made the experience that education about sleep and the circadian clock was the best way to change people's mindset in the long run as they turned into "sleep experts" themselves and started to care about good and healthy sleep. That being said, one of our major messages was that what good and healthy sleep is, may be different for different people.

Can you explain why at 37 years old I still can't get up in the morning like a grown-up?

[jollygoodvelo](#)

Based on our research, there are in fact people at any age that are very early or very late chronotypes. What this essentially means is that your body opens up a "sleep window" during which sleep is considered optimal and most restorative. Getting up early often means to end sleep prematurely and being awake during a time that your physiology is supposed to be asleep. We call this a form of circadian misalignment, when physiological functions and sleep-wake rhythms are not in sync. Because people can be so different chronotypes irrespective of their age, it can just mean that your sleep window is at a later time point than for other people, making it so very difficult to wake up in the morning.

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My mother has a strange condition where she has severe difficulty falling asleep before 3am. According to her, because I was born at around that time, somehow her circadian rhythms got reset or

something. I don't know about that but I recently found out that she frequently doesn't even enter her bed until 5am and usually doesn't fall asleep before 8am. She gets only about 3-4 hours sleep everyday, and it is beginning to impact her health. Her eyes are always painful, her memory and mental capabilities have been declining for at least a decade now and I suspect that she's begun to develop arthritis. She's 60 so none of this is really unusual for her age, except that she's had the sleep thing and the sore eyes ever since I was born some 30 years ago, and none of these things run in her family.

She's tried oatmeal for dinner, warm milk before bed, chamomile tea, some amount of melatonin, coq-10, and some amount of b complex (with cyanocobalmin and folic acid, which may or may not be inferior to methylcobalmin and folate)... just about the only thing that seems to help her relax seems to be head massages, which actually do bring her right to the edge of sleep. Unfortunately, the moment that anyone moves, bam! She's awake. This last detail makes me wonder if this could be psychosomatic, or somehow stress related.

Do you have any advice for a suffering son and a sleepless mother? Thanks!

EDIT: I've tried to get her to talk to her doctors about this stuff, but either she is being too vague (most likely) or her doctors are giving her a brush off. According to her, they recommend the usual suspects, melatonin and b12, with no specific dosages. My mother, being the conservative type, only takes half of what is recommended anyhow. It's infuriating. Her husband has entirely given up on trying to change her so it's all on me. Her sleep schedule wouldn't bother me so much except that it's beginning to have health effects.

[zer0nix](#)

Dear zer0nix,

I am very sorry to hear that your mother has this kind of serious difficulties falling asleep and that it is impacting the life of the people around her as well. I am not a physician and can give only limited advice here. I wish you all the best.

Is there any way to factor in the effect of cultural and technological changes into this? For examples, do adolescents just naturally have late chronotypes, or have we created a culture where adolescents have no free time without staying awake late, thus forcing their chronotypes to be late? Additionally, how much of this is affected by the technology we use? Has the circadian imbalance caused by using phones at late night been factored into saying that the chronotype is late?

[AAABattery03](#)

Cultural and societal factors certainly play an important role in sleep. Some of the cultural differences act through exposure to light and dark, such as the availability of electrical light during dark periods and staying inside during most of the day, e.g., in industrialized nations. On our research we found the same age pattern in every year of survey from 2003 to 2012, and others before us have shown some longer term evidence that indeed people tend to have later chronotypes when they're young. There is however some evidence that the late chronotypes of adolescents may be delayed even more by a modern lifestyle, that is exposure to light after dark and dim light during the day.

As people gets older, why do they (me) wake up earlier and earlier?

[speech freedom](#)

It is not entirely clear what causes the shift towards earlier chronotypes with increasing age. The

circadian system certainly changes, yet different aspects of it can impact phase, that is how your sleep wake cycle is embedded into the 24h light dark cycle. Apart from the circadian system, sleep is also regulated by a homeostatic drive that increases the need for sleep with increasing time awake. The homeostatic drive might also change when people get older, in that it shortens and thus they get tired sooner.