

New doctors' intense and changing schedules take a toll on sleep, activity and mood

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This week, thousands of graduating medical students around the country will find out where they'll head next, to start their residency training. But a new study gives the first objective evidence of the heavy toll that the first year of residency can take on their sleep, physical activity and mood.

The results come from the first phase of a University of Michigan study aimed at understanding the effects of medical training stress. It asks new doctors to wear Fitbit activity trackers around the clock, and sends them mood-tracking text messages every day, for the months immediately before and after they start residency. The researchers call it "digital phenotyping."

On average, the 33 doctors in the pilot study lost 2 hours and 48 minutes of sleep a week after their [residency training](#) began, due to high work load and frequent changes in their schedule that wreaked havoc on their [sleep patterns](#). They got 11.5 percent less physical activity than before, and their mood score dropped by 7.5 percent.

The demands of the intern year of residency appeared to stack up. When they had a shorter sleep time one night, the participants' mood suffered more the next day, and they slept even less the following night.

The study also reveals the impact of the frequent changes in work schedules that medical interns experience as they rotate among the different settings where they get their training. They got less sleep and

had lower mood levels when their sleep schedule was more than three hours from one rotation to the next - for instance, shifting from overnight hospital duty to outpatient clinics.

The new results, published in the *Journal of General Internal Medicine*, give the first objective evidence of a phenomenon that senior author Srijan Sen, M.D., Ph.D. and his colleagues have studied for years. Past studies based on questionnaires have shown a high risk of depression among medical interns, which researchers have attributed to the loss of sleep, high stress and demanding schedules.

To look at the issue on a much larger scale, the team has already recruited more than 500 of this year's graduating students from more than 80 medical schools to take part in the study including enhanced reports about their tracking results. From the class just matching into new residency programs this week, they will be enrolling 1500-2000 more participants; interested students can learn more at <https://www.srijan-sen-lab.com/intern-health-study>.

"Though we expected the start of internship to affect sleep, mood and activity, quantifying the extent and nature of the effects in real time really highlighted the magnitude of changes," says Sen, an associate professor of psychiatry at the U-M Medical School. "The relationship between sleep and mood is clearly bidirectional, but it appears that sleep affects mood the next day more than mood affects sleep."

Sen and his colleagues note that when the training physicians experience the dramatic shift to an earlier wake-up time to start their clinical duties in the hospital, most do not seem to compensate by going to sleep much earlier the night before.

He notes that the system of asking interns to get to the hospital in the pre-dawn hours so they can be ready to inform senior residents and attending

physicians about patients during morning rounds dates back more than a century.

But with modern knowledge about natural patterns of sleep and waking - called circadian rhythms - it may be time to update that practice, he says. Or at least, it's time for residency programs to reduce interns' schedule swings back and forth from early duty to later duty.

"Interns' schedules change day to day and month to month as they rotate through different shift times and settings, and with recent national changes in their work-hour limits, these dramatic changes in work and sleep time have become more profound," he says. "We hope this research will help inform residency programs as they design their interns' schedules."

For instance, going abruptly from a 6 a.m. to 6 p.m. shift suddenly to a 4 p.m. to 10 a.m. shift not only sleep but mood in a way that persists beyond the first few days of working the night shift.

Other studies have shown that long-term night-shift work by all kinds of workers can have a negative effect on mental and physical health and work performance, Sen notes, because of the effects of working when the body expects to be sleeping based on circadian rhythms.

But the body can adjust somewhat to long-term night work. Changing from day shift to night and back in rapid succession, as medical interns do, appears to create much stronger effects on sleep, physical activity and mood.

The new study also suggests that shifting to a later start is much easier than shifting to an early-morning start - another observation that could help residency programs schedule their shifts.

Data from the Fitbits in the two months before the interns began their training showed variation among individuals in their patterns of sleep and activity. Those who tended to be "night owls" before internship began had a harder time than those who were already natural "morning larks", with an early natural wake-up time.

As for the students who are about to graduate and become this year's intern class at hospitals around the country, Sen offers some advice. "Try to stick to the same sleep-wake schedule throughout a rotation, and go to sleep earlier than you naturally would when your [schedule](#) demands an early start time, to reduce the effects of [sleep deprivation](#) and the risk of [mood](#) changes and depression."

But he also hopes that hospitals will recognize the importance of their physicians' sleep schedules to their own health, and to the safety of their patients. "We're learning more and more that [sleep](#) and circadian timing play a role in our mental and physical health. We need to see this as a national priority, not just for physicians in training but even for those in practice - for instance, those who stay up late to finish entering information and orders into electronic health record systems at home, or have other administrative burdens outside of clinical care hours."

More information: David A. Kalmbach et al, Effects of Sleep, Physical Activity, and Shift Work on Daily Mood: a Prospective Mobile Monitoring Study of Medical Interns, *Journal of General Internal Medicine* (2018). [DOI: 10.1007/s11606-018-4373-2](https://doi.org/10.1007/s11606-018-4373-2)

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