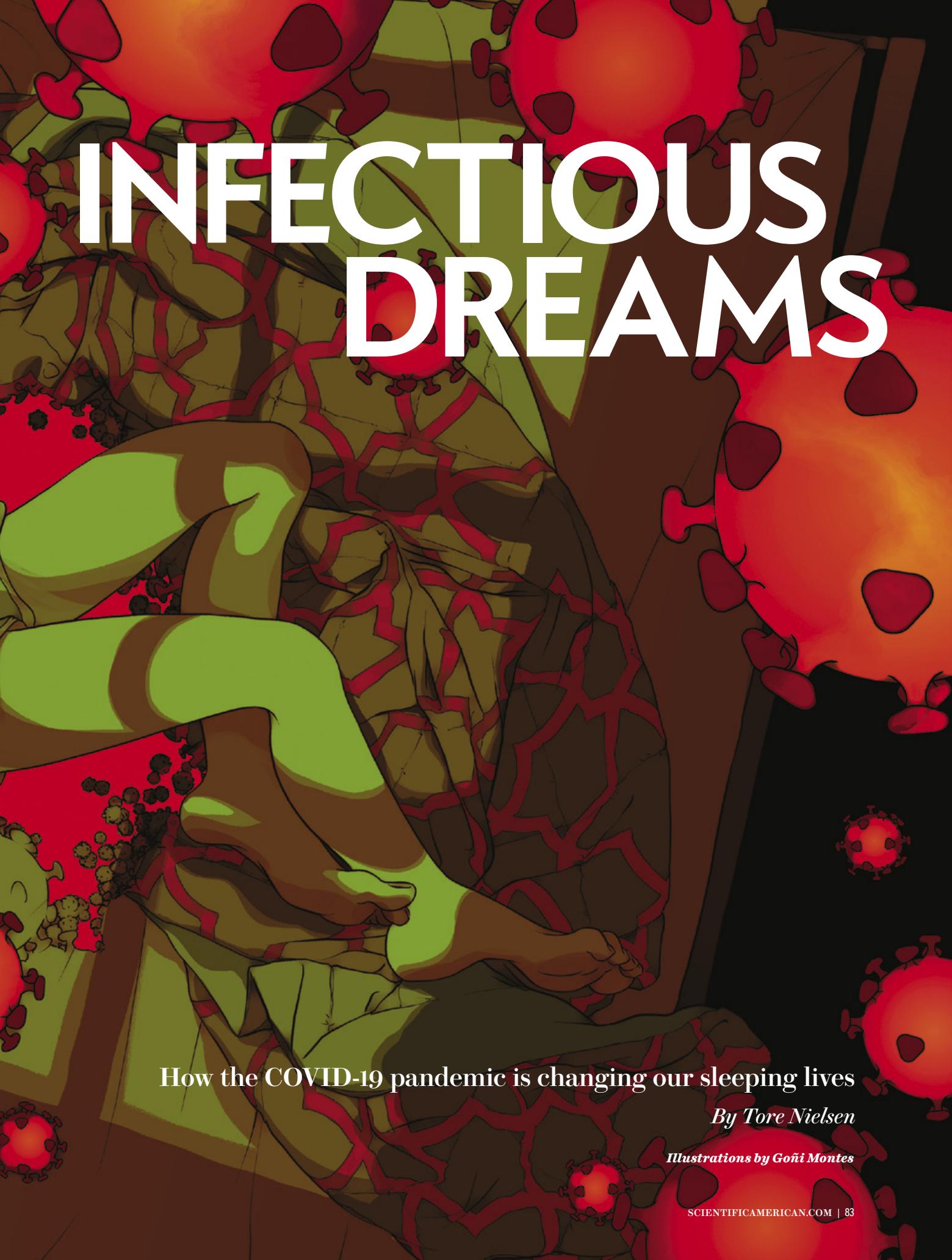




INFECTIOUS DREAMS



How the COVID-19 pandemic is changing our sleeping lives

By Tore Nielsen

Illustrations by Goñi Montes

FOR MANY OF US, LIVING IN A COVID-19 WORLD FEELS AS IF WE HAVE BEEN thrown into an alternative reality. We live day and night inside the same walls. We fear touching groceries that arrive at our doorstep. If we venture into town, we wear masks, and we get anxious if we pass someone who is not wearing one. We have trouble discerning faces. It's like living in a dream.

COVID has altered our dream worlds, too: how much we dream, how many of our dreams we remember and the nature of our dreams themselves. In early 2020, when stay-at-home directives were put in place widely, society quite unexpectedly experienced what I am calling a dream surge: a global increase in the reporting of vivid, bizarre dreams, many of which are concerned with coronavirus and social distancing. Terms such as coronavirus dreams, lockdown dreams and COVID nightmares emerged on social media. By April of that year, social and mainstream media outlets had begun broadcasting the message: the world is dreaming about COVID.

Although widespread changes in dreaming had been reported in the U.S. following extraordinary events such as the 9/11 attacks in 2001 and the 1989 San Francisco earthquake, a surge of this magnitude had never been documented. This upwelling of dreams is the first to occur globally and the first to happen in the era of social media, which makes dreams readily accessible for immediate study. As a dream "event," the pandemic is unprecedented.

But what kind of phenomenon is this, exactly? Why was it happening with such vigor? To find out, Deirdre Barrett, an assistant professor at Harvard Medical School and editor in chief of the journal *Dreaming*, initiated a COVID dreams survey online in the week of March 22, 2020. Erin and Grace Gravley, San Francisco Bay Area artists, launched IDreamofCovid.com, a site archiving and illustrating pandemic dreams. The Twitter account @CovidDreams began operation. Kelly Bulkeley, a psychologist of religion and director of the Sleep and Dream Database, followed with a YouGov survey of 2,477 American adults. And my former doctoral student Elizaveta Solomonova, now a postdoctoral fellow at McGill University, along with Rébecca Robillard of the Royal's Institute of Mental Health Research in Ottawa and others, launched a survey to which 968 people aged

12 and older responded, almost all in North America. Results of these inquiries, published in *BMJ Open* in December 2020, document the precipitous surge, the striking variety of dreams and many related mental health effects.

Bulkeley's three-day poll revealed that in March 2020, 29 percent of Americans recalled more dreams than usual. Solomonova and Robillard found that 37 percent of people had pandemic dreams, many marked by themes of insufficiently completing tasks (such as losing control of a vehicle) and being threatened by others. Many online posts from the time reflect these findings. One person, whose Twitter handle is @monicaluhar, reported, "*Had a dream about returning as a sub teacher in the fall, unprepared. Students were having a difficult time practicing social distancing, and teachers couldn't stagger classes or have one-on-one meetings.*" And @therealbeecarey said, "*My phone had a virus and was posting so many random pictures from my camera roll to instagram and my anxiety was at an all time high.*"

More recent studies found qualitative changes in dream emotions and concerns about health. Dream reports from Brazilian adults in social isolation had high proportions of words related to anger, sadness, contamination and cleanliness. Text

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mining of accounts of 810 Finnish dreams showed that most word clusters were laden with anxiousness; 55 percent were about the pandemic directly (lack of regard for social distancing, elderly people in trouble), and these emotions were more prevalent among people who felt increased stress during the day. A study of 100 nurses conscripted to treat COVID patients in Wuhan, China, revealed that 45 percent experienced nightmares—twice the lifetime rate among Chinese psychiatric outpatients and many times higher than that among the 5 percent or so of the general population who have nightmare disorder.

It seems clear that some basic biological and social dynamics may have played a role in this unprecedented opening of the oneiric floodgates. At least three factors may have triggered or sustained the dream surge: disrupted sleep schedules augmenting the amount of rapid eye movement (REM) sleep and therefore dreaming; threats of contagion and social distancing taxing dreaming's capacity to regulate emotions; and social and mainstream media amplifying the public's reaction to the surge.

MORE REM SLEEP, MORE DREAMS

ONE OBVIOUS EXPLANATION for the surge is that sleep patterns changed abruptly when lockdowns took effect. Early publications demonstrate elevated levels of insomnia in China's population, especially among frontline workers. In contrast, stay-at-home orders, which removed long commutes to work, improved sleep for many people. Respondents in China reported an average increase of 46 minutes in bed and an extra 34 minutes in total sleep time. Some 54 percent of people in Finland said they slept more after lockdown. Overall, from March 13 to 27, 2020, time asleep in the U.S. increased almost 20 percent nationwide, and states with the longest commute times, such as Maryland and New Jersey, showed the largest increases.

Longer slumber leads to more dreams; people in sleep laboratories who are allowed to snooze for more than 9.5 hours recall more dreams than when sleeping a typical eight hours. Sleeping longer also proportionally increases REM sleep, which is when the most vivid and emotional dreams occur.

Relaxed schedules may also have caused dreaming to occur later than usual in the morning, when REM sleep is more prevalent and intense and, thus, dreams are more bizarre. Dream tweets reflect these qualities: *"I was taking care of a newborn girl that had COVID... it was so vivid and real."* Increased dreaming during late-morning REM intervals results from the convergence of several processes. Sleep itself cycles through deep and light stages about every 90 minutes, but pressure for REM sleep gradually increases as the need for deep, recuperative sleep is progressively satisfied. Meanwhile a circadian process that is tightly linked to our 24-hour core body temperature rhythm gives an abrupt boost to REM sleep propensity late in the sleep period and stays elevated through the morning.

After the pandemic began, many people did sleep longer and later. In China, average weekly bedtime was delayed by 26 minutes but wake-up time by 72 minutes. These values were 41 and 73 minutes in Italy and 30 and 42 minutes among U.S. university students. And without commutes, many people were freer to linger in bed, remembering their dreams. Some early birds may have turned into night owls, who typically have more REM sleep and more frequent nightmares. And as people eliminated whatever sleep debts they may have accrued over days or even

weeks of insufficient rest, they were more likely to wake up at night and remember more dreams.

DREAM FUNCTIONS OVERWHELMED

THE SUBJECT MATTER of many COVID dreams directly or metaphorically reflects fears about contagion and the challenges of social distancing. Even in normal times, we dream more about novel experiences. For instance, people enrolled in programs to rapidly learn French dream more about French. Replaying fragments of experiences is one example of a functional role that researchers widely ascribe to REM sleep and dreaming: it helps us solve problems. Other roles include consolidating the prior day's events into longer-lasting memories, fitting those events into an ongoing narrative of our lives and helping us regulate emotions.

Researchers have documented countless cases of dreams assisting in creative achievement. Empirical studies also show that REM sleep aids in problem-solving that requires access to wide-ranging memory associations, which may explain why so many dreams in the 2020 surge involve creative or strange attempts to deal with a COVID problem. One survey respondent said, *"I was looking for a kind of cream that would either prevent or cure Covid-19. I got my hands on the last bottle."*

Two other widely claimed dream functions are extinguishing fearful memories and simulating social situations. They are related to emotion regulation and help to explain why pandemic threats and social distancing challenges appear so often in surge dreams. Many dreams reported in the media include fearful reactions to infection, finances and social distancing: *"I tested positive for pregnancy and covid... now I'm stressed."* Threats may take the form of metaphoric imagery such as tsunamis or aliens; zombies are common. Images of insects, spiders and other small creatures are also widely represented: *"My foot was covered in ants and 5-6 black widows were imbedded in the bottom of my foot."*

One way to understand direct and metaphoric imagery is to consider that dreams express an individual's core concerns, drawing on memories that are similar in emotional tone but different in subject matter. This contextualization is clear in post-traumatic nightmares, in which a person's reaction to a trauma, such as terror during an assault, is depicted as terror in the face of, for example, a natural disaster such as a tsunami. The late Ernest Hartmann, a Boston-area dream and nightmare research pioneer who studied dreams after the 9/11 attacks, stipulated that such contextualization best helps people adapt when it weaves together old and new experiences. Successful integration produces a more stable memory system that is resilient to future traumas.

Metaphorical images can be part of a constructive effort to make sense of disruptive events. A related process is the extinguishing of fear by the creation of new "safety memories." These possibilities, which I and others have investigated, reflect the fact that memories of fearful events are almost never replayed in their entirety during dreaming. Instead elements of a memory appear piecemeal, as if the original memory has been reduced to basic units. These elements recombine with newer memories and cognitions to create contexts in which metaphors and other unusual juxtapositions of imagery seem incongruous or incompatible with waking life—and, more important, are incompatible with feelings of fear. This creative dreaming produces safety imagery that supersedes and inhibits the original fear memory, helping to assuage distress over time.

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This mechanism can break down after severe trauma, however. When this happens, nightmares arise in which the fearful memory is replayed realistically; the creative recombining of memory elements is thwarted. The pandemic's ultimate impact on a person's dreams will vary with whether or how severely they are traumatized and how resilient they are.

A second class of theories—also still speculative—may explain social distancing themes, which permeated IDreamofCovid.com reports. Emotions in these dreams range from surprise to discomfort to stress to nightmarish horror. Tweets located by the @CovidDreams account illustrate how incompatible dream scenarios are with social distancing—so incompatible that they often trigger a rare moment of self-awareness and awakening: “*We were celebrating something by having a party. And I woke myself up because something wasn't right because we're social distancing and not supposed to be having parties.*”

These theories focus on dreaming's social simulation function. The view that dreaming is a neural simulation of reality, analogous to virtual reality, is now widely accepted, and the notion that the simulation of social life is an essential biological function is emerging. In 2000 Anne Germain, now CEO of sleep medicine start-up Noctem, and I proposed that images of characters interacting with the self in dreams could be basic to how dreaming evolved, reflecting attachment relationships essential to the survival of prehistoric groups. The strong interpersonal bonds reiterated during dreaming contribute to stronger group structures that help to organize defenses against predators and cooperation in problem-solving. Such dreams would still have adaptive value today because family and group cohesion remain essential to health and survival. It may be the case that an individual's concerns about other people are fine-tuned while they are in the simulated presence of those people. Important social relationships and conflicts are portrayed realistically during dreaming.

Other investigators, such as cognitive neuroscientist Antti Revonsuo of the University of Turku in Finland and the University of Skövde in Sweden, have since proposed additional social functions for dreaming: facilitating social perception (Who is around me?), social mind reading (What are they thinking?) and the practice of social bonding skills. Another theory advanced by psychology professor Mark Blagrove of Swansea University in Wales further postulates that by sharing dreams, people enhance empathy toward others. The range of dream functions is likely to keep expanding as we learn more about the brain circuits underlying social cognition and the roles REM sleep plays in memory for emotional stimuli, human faces and reactions to social exclusion. Because social distancing is, in effect, an experiment in social isolation at a level never before seen—and is likely antagonistic to human evolution—a clash with deep-rooted dream mechanisms should be evident on a massive scale. And because social distancing disrupts normal relationships so profoundly—causing many of us to spend excessive time with some people and no time with others—social simulations in dreams may play a crucial role in helping families, groups, even societies deal with sudden, widespread social adaptation.

THE ECHO CHAMBER OF SOCIAL MEDIA

THERE IS ONE BASIC QUESTION about pandemic dreams that we would like to nail down: whether the dream surge was amplified by the media. It is quite possible that early posts of a few dreams

were circulated widely online, feeding a narrative of pandemic dreams that went viral, influencing people to recall their dreams, notice COVID themes and share them. This narrative may have even induced people to dream more about the pandemic.

Evidence suggests that mainstream media reporting probably did not trigger the surge but may have temporarily amplified its scope. The Bulkeley and Solomonova-Robillard polls corroborated a clear groundswell in dream tweeting during March 2020, before the first media stories about such dreams appeared; indeed, the earliest stories cited various tweet threads as their sources.

Once stories emerged, more surges in dream reporting through early April 2020 were detected by IDreamofCovid.com and @CovidDreams. The format of most early stories almost guaranteed amplification: they typically described some salient dream themes observed in a survey and provided a link directing readers to participate in the same survey. In addition, 56 percent of articles during the first week of stories featured interviews with the same Harvard dream scientist, which may have influenced readers to dream about themes repeated by her.

The surge began to decline steadily in late April 2020, as did the number of mainstream media articles, suggesting that any echo-chamber effect had run its course. The final nature of the surge remains to be seen. Until COVID vaccines or treatments are fully distributed and with waves of future infections or new viral variants possible, threats of disease and social distancing are likely to persist. Might the pandemic have produced a lasting increase in humanity's recall of dreams? Could pandemic concerns become permanently woven into dream content? And if so, will such alterations help or hinder people's long-term adjustments to our postpandemic futures?

Therapists may need to step in to help certain people. The survey information considered in this article does not delve into nightmares in detail. But some health-care workers who saw relentless suffering later themselves suffered with recurrent nightmares. And some patients who endured the ICU for days or weeks suffered from horrific nightmares during that time, which may in part have been the result of medications and sleep deprivation induced by around-the-clock hospital procedures and interminable monitor noises and alarms. These survivors will need expert help to regain normal sleep. Thankfully, specialized techniques are highly effective.

People who are not traumatized but still a little freaked out about their COVID dreams also have options. New technologies such as targeted memory reactivation are providing individuals with more control over their dream narratives. For example, learning how to practice lucid dreaming—becoming aware that you are dreaming—aided by targeted memory reactivation or other methods could help transform worrisome pandemic dreams into more pleasant, maybe even useful, dreams. Simply observing and reporting pandemic dreams seems to positively impact mental health, as Natália Mota of the Federal University of Rio Grande do Norte in Natal, Brazil, found in her studies.

Short of therapy, we can give ourselves permission to ease up and to enjoy banking those surplus hours of sleep. Dreams can be vexing, but they are also impressionable, malleable and at times inspirational. ■

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