

## By Michael Behar

When Emma was just six months old, her parents, Kate and Jeff, began to suspect she was different from other infants. At mealtimes, Emma, their first child, would take two bites, and then her attention would wander. It took cajoling to get her to eat. As Emma got older, her peripatetic focus became evident in everything she did. "She wasn't engaged with you or the activity," Kate said. "She was off in her own world." Shortly before Emma turned four, her preschool teacher informed Kate and Jeff, who live in San Francisco, that their daughter couldn't follow directions or snap to attention when called upon. In 2009, Kate and Jeff met with a pediatrician and a child psychologist to discuss the issue. The experts arrived at the same conclusion: Emma likely had attention deficit/hyperactivity disorder, or ADHD. (Because of the stigma sometimes affecting people with ADHD or other mental health disorders, TakePart has honored the family's request to use pseudonyms.)

It's a pretty common story: Today, more than 11 percent of kids in the U.S. are diagnosed with ADHD, according to the Centers for Disease Control and Prevention. That's up from 3 percent in 1997. For boys, it's closer to 16 percent. Physicians in the U.S. wrote 48.4 million prescriptions in 2011, a jump of nearly 40 percent in four years. Historically, ADHD

rates in the U.S. have been far higher than in Europe, where, until recently, diagnoses hovered around 1 or 2 percent. But pharmaceutical companies are now aggressively marketing their ADHD products abroad. Between 1998 and 2008, ADHD drug prescriptions in Germany jumped 500 percent—a leap researchers attribute in part to big pharma lobbyists.

What's behind this rash of apparent cases of ADHD in American kids? Experts point to a host of factors. Pharmaceutical firms hard-selling doctors—a phenomenon journalists have extensively

documented—is one. More pernicious are the cultural shifts, educational policies, and economic and social pressures on parents, which are, in a variety of ways, robbing children of unstructured play and physical activity. The upshot: We're subduing our kids-taking much of the childishness out of growing up-to the point that they are becoming impulsive, distracted, and unruly. What used to be called acting like a child is often now diagnosed as a medical condition requiring treatment and referral to a health care system that, psychiatrists and psychologists say, rewards medication over other forms of treatment. Together, these factors may be encouraging what amounts to a giant, uncontrolled experiment with the effects of a class of amphetamines known as psychostimulants on the developing brains of our children.

Psychostimulants ramp up production of the neurotransmitters dopamine and norepinephrine. An abundance of these molecules make kids (and adults) feel calm, focused, alert, and able to tame obstreperous impulses by tempering the brain's pleasure and reward circuitry in the prefrontal cortex. In so doing, the drugs—Ritalin, Adderall, Concerta, and Daytrana are among the popular brands that have become household names—perform superbly at alleviating typical ADHD symptoms, which include inattentiveness, hyperactivity, and impulsivity.

There's no doubt that kids who take these drugs fidget less and focus longer. "The medications seem to reduce the disruptiveness of a child very, very effectively," said Laurence Greenhill, a professor of clinical child and adolescent psychiatry at Columbia University, where he evaluates the safety and efficacy of ADHD medications. "But there is nothing that is changed about you as a student, other than you are not jumping all over the room." Put another way, psychostimulants don't cure ADHD, much as Nyquil won't cure a cold. "If you want to build skills," said Stephen Hinshaw, a professor of psychology at the University of California, Berkeley, "medication is not going to do that."

As kids grow through toddlerhood, their brains forge and prune billions of neural connections. How might bathing immature synapses in chemical compounds alter or impede the normal processes by which a brain wires itself? Doctors couldn't answer that question for Kate and Jeff because scientists can't slice apart kids' noggins to determine if ADHD drugs are disturbing the brain's basic architecture, or neurophysiology.

Put simply, nobody knows what these drugs do to a kid's brain. That's not likely to change soon, because to find out would take decades, requiring a randomized, double-blind study-the gold standard for gathering this type of long-term data. "You'd have to get a thousand kids with ADHD and then randomly assign 500 of them to get medication, and put the other 500 on a placebo," explained Hinshaw, ADHD whose book. The Explosion: Mvths. Medication, Money, and Today's Push for Performance, was published last year (co-written with Richard M. Scheffler). "Ethically, that's just not something you can do."

Emma was too young, at age four, to receive a sure diagnosis of ADHD, according to the American Psychiatric Association's standards at the time. Her pediatrician suggested occupational therapy, which Emma did. But a few years later, the doctor referred specialist—a Emma to а developmental pediatrician—for a firm diagnosis. Kate was taken aback when she suggested Ritalin, especially since Emma had seen positive results from the occupational therapy. "She only met our daughter twice," Kate recalled. "[Emma's] occupational therapist, who she saw on a weekly basis for four years, told us medication was ridiculous."

Kate "had a bad feeling" about giving her daughter Ritalin after reading reports questioning the drug's safety: "I hated to make a decision for her to do something that would affect her developing brain." She and Jeff had enlisted Emma in an increasingly popular ADHD treatment known as play therapy. Every week for the past four years, Emma, now eight, has been partaking in one-hour sessions that entail exactly what you might think they do: play.



She dallies and romps in a souped-up tumbling gym while an occupational therapist gently guides her actions.

**Psychologists don't always agree** on what precisely play therapy should look like, so techniques vary widely. One approach involves one-on-one time between a therapist and a child, in a room full of toys. More often psychologists coach parents and teachers on ways to ensure the ADHD child gets ample physical exercise. But the goal is always the same: engage the prefrontal cortex—a part of the brain that's integral to master-planning skills, problem solving, self-control, and impulsivity—through unstructured and so-called rough-and-tumble play.

Reduced time for recess and creative curricula; budget cuts leading to larger class sizes; overworked, overstressed parents; and the misguided drive to make high achievers out of kindergartners are all contributing to a diminution in the amount of time kids spend just goofing off. Kathy Hirsh-Pasek, a professor of psychology at Temple University and director of the Temple Infant and Child Laboratory, has researched and written extensively on the importance of play in child development—and the perils of restricting it too much. To foster growth in kids so they become healthy, happy adults, she said, play "is the magic potion. Monkeys play, goats play, dogs play, even fish play. The more we disrupt that natural interaction, the more we're experimenting with our kids."

Emma's mom has become a believer. "We've seen so much success with the physical activity, it's blown me away," said Kate. "I was expecting we'd just get her to baseline normal. But she exceeded it. She's been on honor roll twice—and I thought the ADHD was going to be an impediment to that."

Highly educated, high-achieving American parents want their children to grow up to be either Steve Jobs or Misty Copeland—creative, inspired individualists. Our economy needs more creative minds—outside-the-box thinkers rather than automatons programmed for factory work. It's all the more ironic then that we're drugging one in six boys so he acts like his obedient peers.

**Novel techniques for observing neurons firing** and wiring in a human brain remain too new to generate a reliable snapshot of it. It's still possible, however, to assess the size of a kid's brain—and its component parts—to determine how it develops over time. Using imaging devices such as MRI and PET scans, several research teams have concluded that some children diagnosed with ADHD have brains whose prefrontal cortices measure up to 10 percent smaller by volume than average.

But in looking at the overall population, these size differences appear in just 4 percent of children proportionally far less than the 11 percent of kids diagnosed with ADHD. Why the discrepancy?

Scientists don't dispute that ADHD is a legitimate condition, often hereditary, with genetic and physiological underpinnings. What they dispute is the percentage of children who actually have it. Among many pediatricians, developmental psychologists, and neuroscientists there is an increasing suspicion that most cases of ADHD are just kids being kids: curious, restless, and impulsive. Curbing these natural instincts-the innate need to engage in rough-andtumble play, an activity well documented in virtually every juvenile mammal-results in behavior that strongly resembles ADHD. Jaak Panksepp, a professor of integrative physiology and neuroscience at Washington State University, insisted that the rise in the rate of ADHD diagnosis "may reflect, in part, a cultural illness rather than any biological disorder."

Hirsh-Pasek agreed. "We're breeding lack of attention," she said.

Not every child kept from playing enough develops ADHD. "There is a gene-environment interplay," said Hinshaw. "It may be that some kids are born more susceptible to those environmental influences." Even so, ever more evidence indicates that play deprivation mav stunt prefrontal cortex development—a phenomenon Panksepp has documented in the brains of rats, which must be euthanized to observe changes to neurophysiology. So while only 4 percent of kids are believed to be born with the disorder, others can acquire it (or ADHD-like behaviors) if they're forced to sit still too much.

Emma's success story comes as no surprise to Panksepp. "The world is full of those anecdotes," he said, noting wryly that "the plural of anecdotes is data." Panksepp's research on affective neuroscience—a field he has been credited with creating—explores the relationship between neurons and emotions. Panksepp pioneered neural mapping and has demonstrated that certain animals possess a form of self-awareness and even feelings.



He isn't the only scientist who has looked at the important role of play in the growth and development of humans and other mammals, or the dangers of restricting it. Many, including Alison Gopnik, a professor of psychology at the University of California, Berkeley; Kenneth Ginsburg, a physician and professor of pediatrics at the University of Pennsylvania's Perelman School of Medicine; and Anthony Pellegrini, a professor of educational psychology at the University of Minnesota, Twin Cities, have published studies in top journals, such as *Cognition, Pediatrics*, and *Nature*.

But Panksepp may have been the first to reckon that play is essential for normal brain development in all mammals, including humans. By the early 1980s, Panksepp had drafted neural maps for maternal instincts, seeking drives, fear, rage, lust, and panic. "Then I began to wonder, 'Is there another basic emotional system?' " he recalled. So for the next 20 years, he practically lived in his lab (he was at Bowling Green State University in Ohio before going to Washington State) meticulously observing rat pups romping and wrestling. Some were permitted to play unfettered; others were confined to solitude.

During the experiments, Panksepp euthanized some rats from each group and examined their brains with powerful digital imaging scanners. It turned out that the more he prevented rats from playing, the fewer changes he saw in their brains. Restricting play in rats had visibly curbed neural growth. When he allowed play-deprived rats to mature into adults, they transformed into the rodent equivalents of sociopaths. That led Panksepp to theorize that if play is critical for rats to develop normally, maybe it functions similarly for children. Rat brains are not human brains, certainly, and many phenomena and chemical compounds observed or tested in rats do not manifest or have the same effect when applied to people. But many of them do—enough that science continues to use the animals as a proxy, including when testing medications for depression and anxiety that are now widely prescribed.

"Play is like hunger—the longer you've been without play, the more you need play," Panksepp said. Starving kids of play, Panksepp said, only makes them crave it more—a craving doctors, parents, and schools mistakenly ascribe to ADHD. Medicating doesn't satiate their appetite for play; it merely suppresses it.

In 2003, Panksepp hoped to surmise whether play could make hyperactive rats into kinder and gentler beings. To simulate ADHD, Panksepp made tiny lesions in their frontal cortex using a long needle. When the rats healed, they exhibited ADHD-like behavior—restlessness with a ravenous appetite for play. He divided the critters into two groups, with one given ample time to frolic. Then he logged their movements.

The results were clear: The rats that had ample playtime were nearly twice as likely to just chill out, as compared with their shackled brethren, which darted fitfully around. He repeated the experiment, this time with rats whose brains hadn't been altered. He exposed the rats to loud noises intended to startle them. Here, too, the rats that played were harder to frighten and scampered less. Put simply, no play produced high-strung varmints.

In 2010, Panksepp devised another study to ascertain how animals are hardwired for play. Is it in our DNA? His target was a gene called insulin-like growth factor 1, or IGF-1, which influences neuron growth, production, and resilience. Panksepp set some rats loose in a rodent Romper Room, inhibiting the activity of a control group.

After his subjects were euthanized, their brains were analyzed with a DNA microarray, a tool that lets researchers rapidly determine which genes switch on when exposed to certain stimuli—and whether they do so in concert with other genes. The results shocked Panksepp: "During a one-hour period, 400 [IGF-1] genes were shifted in the cortex." That hour occurred while the rats were playing. "It means that play is activating one of the most important growth factors in the brain. That's big-time." Extrapolating the results to children, he said that without play, "your kid is missing 400 genes not being activated on a regular basis."



When British pediatrician George Still first described ADHD in 1901, "the actual incidence of the disorder...was about a half of 1 percent," noted Panksepp. Ask him why the 20-fold rise since, and you'll get an impassioned sermon. Panksepp imparts some blame on an entrenched pharmaceutical industry, with its "enormous money pipeline" that pays doctors (directly and indirectly, through speaking gigs, golf junkets, and other gainful arrangements) for promoting its drugs. More so, his theories on the ADHD surge are boiled down in a 2007 essay Panksepp wrote for the Journal of the Canadian Academy of Child and Adolescent child Psychiatry: "Our current 'no left behind'...policy, focusing on reading, writing and arithmetic, at the expense of physical education and the arts, continues to steal natural play functions away from our children, to be replaced, all too often, activities with regimented and sometimes psychostimulant medications that reduce play urges."

"Expectations are developmentally inappropriate for kids in our culture today," contended Dee Ray, a professor of counseling and higher education at the University of North Texas in Denton, where she directs the Child and Family Resource Clinic. She's also a registered play therapist. "There is too much structure, and there are things [kids] are not developmentally designed to do yet but being asked to do." She pointed to increased academic instruction in kindergarten and less recess in the later grades as examples.

Anita Bundy, a professor of occupational therapy at the University of Sydney, said, "We are structuring children so much—dance lessons, music lessons, soccer lessons—they never have to think, 'How do I entertain myself and use what's around me to have fun?' It's making a bunch of brain-dead kids."

According to Bundy, the relentless pressure on today's children to excel is spawning an anxiety epidemic. The two predominant symptoms of anxiety? "Inattention and hyperactivity," she said.

Several factors may be behind these developments and the soaring rates of ADHD. Our schools' singleminded emphasis on standardized testing since the No Child Left Behind Act took effect in 2002, paired with larger classrooms, "encourage teachers to develop punitive methods to force children to sit still and listen," said Ray. "[ADHD] has been highly correlated with reduction in physical education and, worst of all, reduction of recess time." That leads to "boredom and distraction for children, which is often manifested in symptoms associated with ADHD." In the first five years of No Child Left Behind, almost half of U.S. school districts took significant time away from recess and creative curricula in favor of the math and reading that's subject to standardized tests, according to the Center on Education Policy. Yet in 2010 the CDC found that physical activity in school improves academic performance, including on standardized tests; there was "no evidence" that recess was negatively associated with cognitive skills or academics.

Indeed, how we school our children might be cultivating ADHD, "which didn't exist before we had a compulsory education," Berkeley psychology professor Hinshaw pointed out. "Then, 150 years ago, society said every kid needs to sit still in a classroom and learn. Not surprisingly, literature on something called hyperactivity emerged around the same time."

In a forthcoming study, Hinshaw examined the correlation between standardized testing and ADHD diagnoses. Prior to 2001, about 30 states linked a

school's budget allocation with its ability to raise test scores. At the time, these same 30 states had the country's highest rates of ADHD. With the passage of No Child Left Behind, the remaining 20 states became similarly accountable for test scores. "We found that in these 20 states, the poorest kids saw their rates of ADHD diagnoses go up by 60 percent in five years," Hinshaw said.

His explanation? "Districts are incentivized to diagnose these poorer kids because they are the lowest test scorers" in aggregate, he said. Low scores drag down a district's average, putting resources at risk, because No Child Left Behind withholds funding from low-performing schools. Many other experts say the same thing. Even more nefarious, Hinshaw pointed out, is that the test scores of pupils in special education programs aren't counted in the district's average. How do you justify placing a kid in special ed? Diagnose her with ADHD. Hinshaw asked, "So what's the best way to raise your district's test scores" under No Child Left Behind? "Take out the lowest scorers. This was a direct incentive to over diagnose ADHD in order to keep getting your funding."

No doubt, it would be too much to lay the expansion of ADHD diagnosis entirely at the door of No Child Left Behind, and those who study school performance by and large agree that assessments of students and accountability of schools are necessary for getting the most for our education dollar. But Hinshaw feels strongly that "Today, the rates [of ADHD] are skyrocketing" in part because "there is more a press for conformity in schools rather than individual differences."

Hirsh-Pasek believes, similarly, that classifying kids as disabled too often stems from the school's needs rather than the child's. "We know that many kids who are sent to special ed classes don't have any special ed problems—that is, biologically," she said. "They are sent there because they are disruptive."

**Sorting out which children have ADHD** and which are just rambunctious kids—who, when freed from the classroom environment, act perfectly normal—is tricky. "In my experience, most diagnoses of ADHD were originally suggested by a teacher—a person who has no background to make such a suggestion," Ray said. (Emma's first-grade teacher backed the developmental pediatrician's suggestion that Emma be prescribed Ritalin.)

For the most part, accurate diagnoses come down to resources, or the lack thereof. "There are only 7,000 child and adolescent psychiatrists in the U.S. In some states there are only one or two in the entire state," notes Eugene Beresin, a professor of psychiatry at Harvard Medical School. "[But] there are 14 to 20 million kids with psychiatric illness."

With so few child psychiatrists to manage ADHD, diagnosis typically falls on pediatricians, whose first (and only) course of action often is to prescribe medication-in many cases is the only reimbursable treatment. Most health insurance companies aren't required to reimburse for therapies like Emma's, or for equivalent time spent on psychotherapy as they are for medication visits, or for other nondrug solutions that might help with ADHD. In many cases, the only reimbursable treatment is medication. (Obamacare and rules finalized only recently under the Mental Health Parity and Addiction Equity Act of 2008 are changing this state of affairs, to a degree.) Behavioral therapy is often excluded, said Hinshaw, "because it's more expensive and takes more time, and M.D.s aren't trained to do it-they're trained in prescribing medications."

Beresin finds this extremely frustrating. "Why aren't insurance companies paying for mental health services by doctors who understand what it takes to treat kids?" he said. "If you told someone with diabetes or hypertension the insurance company isn't going to pay for the evidence-based most-effective treatment, there'd be a revolution in the streets."

Panksepp has chronicled his experiments in more than 330 articles and essays. He has written two acclaimed books, received 18 awards and honors, given keynote speeches at dozens of leading science conferences, and been interviewed by People and Discover magazines. Money hasn't followed; Panksepp has endured a near constant struggle to garner funding. He gets a modest R&D stipend from his university, but for major research endeavors, he needs underwriters. The National Institutes of Health has repeatedly turned down his grant proposals. "For some reason, our work on ADHD is seen to be radical," said Panksepp.

That may be changing. New research into the biological and evolutionary origins of ADHD is bolstering Panksepp's findings while encouraging other scientists to investigate the association of rough-and-tumble play and play-type therapy with higher levels of focus and concentration in elementary school–age children diagnosed with ADHD. Dan Eisenberg, a professor of anthropology at the University of Washington, is trying to determine how a recently discovered gene linked to dopamine receptors in the brain, named DRD4-7R, could be making its carriers—about 20 percent of us—less fit for modern society even though it has played an important role in evolution.

Eisenberg's study of DRD4-7R in a tribe of nomadic herders in Kenya called the Ariaal, about half of whose members recently quit their old ways and took up an agrarian existence, suggests that ADHD-like behavior benefits hunter-gatherers. In the stillnomadic group Eisenberg studied, the men with DRD4-7R were healthier and overall nutritionally better off than those without it. Even more telling was that the gene had the reverse effect on the Ariaal who became farmers: Those with the so-called restless gene were more likely to be malnourished. ADHD-like behavior may therefore benefit huntergatherers, who require a sort of hyperawareness to survive, while farmers who can't focus might not have the patience or persistence it takes to grow crops.

Hinshaw told me that early humans with DRD4-7R would have been at an advantage. That holds true today: A kid with DRD4-7R might simply thrive better in a different environment. ADHD, maintained Panksepp, is nothing more than "a normal variant of human diversity."

**Most researchers will say that ADHD drugs** are no better at curing ADHD than cold medicine is at killing cold viruses. Even so, there's emerging research suggesting that ADHD medication might rewire the prefrontal cortex, albeit subtly, producing physiological changes and not just symptomatic ones. This work is still being evaluated and remains highly controversial, Hinshaw said.

Ritalin has been prescribed for children since the late 1950s, and its defenders will insist there's been no explosion of psychopaths in the years those kids have grown up. Indeed, medical research has found more mental health problems the drug can treat. Nonetheless, since psychostimulants came into use, rates of clinical depression have risen significantly in the U.S.; the condition is now the leading disability among children and adolescents, and nobody really knows why. It's well established that messing with dopamine levels can impair a brain's ability to regulate moods.

Hirsh-Pasek thinks more than just educational policy or teaching styles are to blame, pointing out that kids are, on average, in class just 20 percent of their waking hours. "We need to ask what's going on outside the classroom," she said.

Panksepp faults a culture that's increasingly unwilling or unable to provide kids with sufficient play, preferring a Band-Aid solution. "Put a kid on Ritalin, and he's no longer socially marginalized," he said. Bundy added, "[Drugs] are an easy fix. Part of it is that parents are so busy, so you give them a pill to make their kids better, and they don't have to think about it. [Parents] want stuff to happen right now. They don't realize that there isn't a lot of research on the long-term effects of ADHD medications."

When Kate and Jeff opted for play therapy over medication for Emma, they chose a protracted and costly path that demanded a commitment many parents would shudder at. "It was overwhelming at the beginning," said Kate. "We did one hour once a week, and they gave us homework to do daily." That included rearranging their living room to make space for an indoor trampoline and a foam crash pad for Emma to burn off excess energy. The annual cost of play therapy is greater than Emma's private-school tuition. Perhaps most of all, play therapy requires patience and resolve. "The results aren't immediate," said Kate. "It's not like taking a pill. It's like trying to lose weight, where you're working and working, and some weeks you might even gain a pound. Sometimes you feel like it's not doing anything. But now that we can look back on the long game, we've seen that it has. All the extra effort was worth it."