# Hediatrician

Former Hollywood filmmaker Michael Rich studies how media affect youth.

by CARA FEINBERG

HIS PAST JUNE, the U.S. Supreme Court decided that violent video games posed no more danger to children than the grimmest of Grimms' fairy tales. At issue was a California ban of the sale of violent video games to minors—and seven of the nine justices struck it down, agreeing that it restricted minors' access to free speech. Justice Antonin Scalia, LL.B. '60, writing for the majority, went farther, stating that the evidence of video games' harmful effects was no stronger than that for any other violent media. "Certainly the books we give children to read...contain no shortage of gore," he wrote. "Cinderella's evil stepsisters have their eyes pecked out by doves. And Hansel and Gretel (children!) kill their captor by baking her in an oven."

As a pediatrician who studies media's effects on children's health, Michael Rich, M.D. '91, M.P.H. '97, believes Scalia got it wrong—and that science and common sense are on his side. You simply can't compare a fairy tale to a graphic video game where humans are torn limb from limb or beg for mercy as they're tortured, he says: "Written stories require translation in your imagination. A kid only imagines what his or her life experience allows."

But ultimately, Rich believes, this is not an issue for the courts. For decades, he explains, the effects of media on children have been a polarizing issue that often gets posed as a moral question. But he isn't interested in proving whether media products are good or bad, nor does he strive to find ways for government to regulate them. Instead, he hopes to reframe the question, looking at media explicitly as a public-health issue—like exercise, nutrition, or sleep—with physical, mental, and social consequences.

As an associate professor at Harvard Medical School and the School of Public Health, Rich has spent the last two decades gathering—and in many cases, conducting scores of studies, some linking media violence to increased aggression and high-risk behavior in children. "Media aren't ever going to disappear," he says. Recent national studies of kids 8 to 18 bear that out. According to a 2010 study by the Kaiser Family Foundation, the average American youth takes in nearly eight hours a day of media—or 10, counting the time spent using more than one form at a time. "That's two hours more than they found just five years ago," Rich notes. Even kids under six use media for more than two hours a day, their parents report. "This is the air kids breathe, he explains. "And in many cases, we have no real idea how it's affecting them."

Ten years ago, he and his colleagues set out to change that, founding the Center on Media and Child Health (CMCH) at Children's Hospital Boston, Harvard Medical School, and Harvard School of Public Health. Scientists there conduct their own research, and the center has also become known for its searchable online database—the only place in the world where parents and professionals can dig into a library of multidisciplinary research on every aspect of media and health—much of it translated from academic jargon into abstracts in English plain enough for a child to read. Rich hopes to bring the same scientific approach to the study of media that the science of nutrition brings to our daily food choices—and thereby empower parents and caregivers to make better-informed choices on their "media diets." In both realms, "There are nutrients and 'empty calories,'" Rich explains. Without solid scientific research, "How are parents ever supposed to know which is which?"

SITUATED at the end of a narrow carpeted hallway in a 1960s-era hospital building, the Center on Media and Child Health is a collection of nondescript offices distinguished only by their décor a clear homage to the subject scientists here study. The bathroom is plastered with classic Hollywood posters—Alfred Hitchcock's *Psycho* and Charlie Chaplin's *The Kid*; above the receptionist's desk hangs a poster of *The Wizard Of Oz*'s Dorothy. Rich's own office door sports a bumper sticker: "Surgoen Generel's Warnig: Te-livison Promots Iliteracy."

In many ways, the walls reflect the researchers' appreciation and enjoyment of media simply as conduits for information. That means acknowledging the halos as well as the horns. "We have a very powerful ally in media if we can recognize it," Rich says. Video games, for instance, are among the most effective technologies available for teaching—delivering rewards for practice and, like all pleasure, a likely flood of dopamine to the brain with each success. But just as with food, too much junk can cause all sorts of health problems.

Rich and his colleagues have compiled more than 3,400 studies on media and health, ranging from issues of obesity (children who watch more TV snack more often and consume more fast food and sweets), to advertising (in the late 1990s, 50 percent of three-year-olds could identify Joe Camel and connect the character with Camel cigarettes), to alcohol use and risky sexual behavior. One study showed that exposure to alcohol advertising on TV had a more potent effect on alcohol use than age, gender, parental influence, social status, or church attendance. Another found that more than 70 percent of network shows contain sexual material, but less than 10 percent deal with sexual risks or responsibilities.

"It's not just how much time kids spend with media," Rich explains, "it's what they watch." In one study published in 2006, lead author David Bickham, then a CMCH postdoctoral fellow, and Rich found that the quantity of media consumed yielded a *positive* result: youths who spent time watching TV with friends tended to be more social, spending more time doing non-media-related activities with their friends. But when the researchers looked at media content in general, they found that youngsters who spent more time watching violent programs tended to be much more socially isolated.

Most of these are correlational studies that cannot identify cause and effect. There is no way to determine, for instance, whether violent media made youths more socially isolated, or if socially isolated kids tend to gravitate toward violent media. "But that doesn't mean we should ignore the findings," Rich cautions. Take cell phones as an analogy, he says. Every year, more research suggests they might (or might not) cause brain cancer. Yet "We don't stop using them," Rich points out. "We just might think of precautions and adjustments, like using headphones." More importantly, he adds, correlations between media consumption and children's behavior may be telling us something about children themselves—and what they need: "Perhaps children who watch a lot of violent TV, or who use media to stimulate themselves, are looking to meet needs that are not unlike the satisfaction they get from actual risky behavior." It may not be media that *cause* their behavior, he explains; media use and content may flag children who are already at higher risk—"and they may derive some kind of benefit we haven't even explored."

"We know that children's brains are different from adults'," he explains. Though all brains change and forge new nerve pathways throughout life, those of infants and young children are especially plastic. With virtually no circuitry devoted to primitive survival reflexes, the human brain is among the most embryonic at birth. "Every other organ in our bodies is a small functional version of its adult self," Rich notes, but the infant brain is entirely dependent on the care of others. That means the human brain is built to learn, forging original pathways created by interaction and environment and pruning away unnecessary connections as it ages. This is why babies who learn languages from birth can hear and mimic sounds that most adults simply can't pick up, he says: the babies' brains haven't yet set well-worn neural pathways.

Nearly all acquired chronic health conditions—obesity, eating disorders, HIV and other sexually transmitted diseases, and tobacco, alcohol, and drug use—start with behaviors developed in childhood and adolescence. And media, Rich says, "are arguably the most powerful forces…kind of like a 'Superpeer' in the psychosocial lives of adolescents."

Yet medicine has been among the last disciplines to formally recognize these factors. In a 2008 abstract, Rich and his colleagues reported that only half of the 200-plus medical residency programs queried offered formal education on media. Most schools mention media in conjunction with other health topics

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like obesity or exercise, but in the absence of formal lectures *acknowledging* media's importance in the environment in which kids develop, "doctors may not view media as highly influential health factors," says Rich—and as a result, they may not ask patients or their parents about media use, or help parents manage their children's risks.

RICH KNOWS that to change behavior, he needs to change minds. As a result, he has become a personal ambassador for his cause, advising both media and medical entities, lecturing publicly, and appearing as an expert on television. Despite his white coat and trail of academic accolades, he has an easygoing style and quick wit. As a clinician, he puts even his shyest patients at ease. At a compact five-foot eight, he's often no taller than the teens he works with, and pries forth reluctant smiles with self-deprecating humor. ("Look at me," he tells one patient concerned about his height, "I'm a fire hydrant with legs.") This makes him that rare doctor who can connect emotionally with the typically sullen, often completely shut-down adolescent patients and study subjects who parade through his clinic's door. But in the field of media research, Rich stands out for an entirely different reason; until he was 31, he was neither a doctor nor a scientist, but a fulltime Hollywood filmmaker.

In his twenties, Rich worked with famous directors, including Akira Kurosawa (a Luce Scholarship sent him to Japan

> as an apprentice and assistant director), and as a Hollywood script doctor, writing and rewriting scenes (uncredited, and often unused) in several well-known films of the 1980s. Eventually he became disillusioned with writing scripts "by committee" and, 11 years into his film career, went to medical school after a year and two summers of pre-med training.

> > Today, he pours his energy into studying the very medium he once worked in. But in a scientific field that most often relies upon observation, self-reports, and surveys, Rich and his colleagues have a unique approach: besides asking kids and their parents to describe their own media use, the CMCH researchers use media themselves to reveal the electronic environment young people now inhabit.

In the late 1990s, Rich placed video cameras in the hands of study subjects, lending asthmatic children tools that could

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literally show clinicians the environment and circumstances affecting their disease. What resulted was a novel, ultimately award-winning research method (see "Lights. Action. Asthma," November-December 2000, page 14) that changed not only the power dynamic between clinician and patient, but also doctors' treatments and patient outcomes. "One of the strengths of this method is that it captures things you weren't looking for," Rich said then-whereas an interview "is already framed by the questions you ask." When doctors have a better sense of patients' actual environments, they can work much more collaboratively-and more effectively. When Rich and his colleagues watched some of the tapes made by his asthma patients, they found that the footage revealed risk factors that patients either didn't suspect or didn't want to admit: a mother who smoked in her asthmatic child's bedroom (despite adamantly claiming she didn't); a house described as "100 percent allergen-free" in which plants filled the entrance hall from floor to ceiling. (The mold, dust, and bugs that plants can attract are serious asthmatic irritants.) One video diary showed a teenaged patient coughing violently while using hairspray, which can trigger a severe asthma flare-up.

In the years since Rich implemented the study, the video-camera technique has been used for other health assessments, including HIV, obesity, and other chronic conditions. Yet he and his colleagues are still among the very few in the medical world to use media as research tools. It's not that video cameras have no role in research, Rich explains—they often record patients in sleep labs, for instance, or document behaviors in social-science research. "It's that within the research community, video cameras as actual measuring tools feel alien." Most medical researchers are trained to take measurements with surveys, questionnaires, and quantitative diagnostics. Compared to such tried-and-true methods, he says, "Watching, analyzing, and coding videotape into usable statistical findings is time-consuming and expensive, and often requires a specially trained staff."

For the past few years, Rich's team, led by CMCH visiting scholar Craig Ross, a doctoral candidate at the Boston University School of Public Health, has been conducting a longitudinal study in Manchester, New Hampshire, that aims to catalog middleschoolers' media use. At the outset, researchers recorded subjects' heights and weights, and a broad range of other health information (variables they will track year after year to compare health outcomes). Then the team gave participants four tools to record their media use: a high-definition camcorder; a personal digital assistant (PDA) that would buzz several times a day, reminding kids to write down what they were doing; a time-use diary; and a retrospective questionnaire. The questionnaires were a standard method for gathering information, but the camcorder was not. The students, responding to random beeps throughout the day, were expected to answer their questionnaires and then use their camcorders to make a 360-degree pan of their surroundings.

"Most of the media-use data we have in our field—and we don't have much—is based on paper and pencil measures...kids or parents estimating their children's media use," explains Northwestern University professor Ellen Wartella, another researcher on the effects of media on children. "Michael's methodology is a much more robust measure—a measure against which we can compare the questionnaire answers." The videos, she explains, create a more complex picture of what kids are *actually* doing. A student may write "I am watching TV" on her

questionnaire, but a video pan may reveal that she is also texting, listening to music, and Facebooking on her computer at the same time—information that might never have surfaced in a penned survey. Such study data, Wartella points out, provide the baseline information researchers need in order to ask their next set of questions: "We can't figure out how kids are affected by media if we don't know how they use it."

Just three years into their research, the Manchester study has published few findings, though there are many in the pipeline. This is, in part, a function of the nature of longitudinal research. Besides having to analyze hours of vid-

eo footage (winnowing out, in the process, the irrelevant videos teens often make when they suddenly acquire a video camera), scientists must wait for data to accumulate over the years before they can compare health outcomes, because many conditions develop gradually.

This past year, Rich and his coauthors presented their first findings at the Society for Adolescent Medicine and published an abstract in The Journal of Adolescent Health. The research examined correlations between drinking age and media use, and, says Rich, "We didn't find what we thought we would." Their hypothesis was that kids who spent more time using media would begin drinkingat an earlier age, yet the data showed no correlation between the two. "But kids who used multiple kinds of media at once," he adds, "did drink earlier." Media multitasking-a reality

**Michael Rich** 

now for most children—had a significant effect.

Although media have been a part of children's lives for generations, kids today have more access to more types of media than ever. With the proliferation of portable options—smart phones, laptops, handheld video games, iPads, and ebooks-young people now can not only stay connected 24/7, but also connect via several platforms at once: texting while surfing the Internet, watching videos, listening to music, and talking on the phone. In the past five years alone,

### Multitaskers felt more confident about their performance, kids are doing with media, it's what but *non-*multitaskers performed much better.

according to that 2010 study by the Kaiser Family Foundation, the proportion of 8- to 18-year-olds with their own cell phones grew from 39 to 66 percent. The number of kids owning MP3 players jumped from 18 to 76 percent. "Kids today are multitasking at a level we've never seen before," says Rich. "And people-particularly parents-want to know what this means.

"Take multitasking, for instance," he continues. "There are already studies out there, but very few, if any, deal with children. Most focus on college students and adults." And most, like his own work, raise more questions than they answer. One of the most arresting studies was done recently at Stanford University, where researchers put self-described high-tech jugglers and non-multitaskers through a series of tests where, among other tasks, they were told to focus on one set of colored shapes flashing on a computer screen, and to ignore another set. The habitual multitaskers felt more confident about their performance afterwards, but it was the non-multitaskers who performed much better. Heavy multitaskers simply could not ignore the extraneous information.

"Our brains are programmed to be interrupted," Rich explains. We get an adrenalin jolt every time we receive a new stimulus—a reward for paying attention to the new. And with the improvement of brain-imaging technology in the last two decades, researchers can now actually see this process at work.

"On a molecular level, several studies have shown us that exciting stimuli causes a release of dopamine and other neurotransmitters in the brain," says neuroscientist Markus Dworak, a former Harvard research fellow in psychiatry who focuses on sleep behavior. In 2007, he studied boys aged 12 to 14 who were asked to spend alternate nights either playing video games, or watching action movies, for an hour after finishing their homework. Dworak and his colleagues then measured the boys' brainwave patterns as they slept and found that both activities led to much lower sleep quality (though the video-game players consistently found their sleep more disrupted). When the boys were asked to recall vocabulary words they had learned before their nightly media sessions, their ability to remember the words dropped significantly after playing video games-but not after watching action movies.

The brainwave patterns, says Dworak, showed how the video games affected sleep quality. Sleep is the time when the brain stores information, when it decides what is important to keep or delete, he explains. "We don't know whether the boys' learning suffered because they slept poorly," he says, "but we do know that information that is exciting tends to get stored in the brain much more easily....Perhaps the excitement of the video games just took precedence over the less exciting vocabulary lesson."

This is all preliminary research; even the definition of "multitasking" is up for grabs. Some research indicates that true multitasking—the ability to do several similar tasks at once—just doesn't exist. "What's really happening," Rich explains, "is a rapid toggling of our primary attention: if we are doing two or more tasks that require the same type of attention, something has to recede to the background."

> Of greater concern is not what they may not be doing as a result of them. Recent imaging studies examining the brain during specific

tasks also revealed how the brain functioned in the tasks' absence: the resting brain used as much energy as the task-focused one. Rather than shutting down when there was no outside input, a whole network of nerves across various parts of the brain—the emotional center, visual cortex, memory—lit up, Rich explains, suggesting that periods of rest are critical for brain development: for creating new connections, synthesizing information, and forging a sense of self.

Constant stimulation may deprive kids of much-needed down time—a point Rich made last year in a speech to the American Academy of Pediatrics entitled "Finding Huck Finn: Reclaiming Childhood from the River of Electronic Screens." Rich then urged physicians to ask patients about their media histories and outlined the risks linked to certain types (and amounts) of media use, among them obesity, anxiety, desensitization to violence, and high-risk behavior at an earlier age.

But Rich also reminded fellow pediatricians that, powerful as they are, "media are neutral." Used thoughtfully, he explained, "media can do great good—connecting, informing, and educating." Children spend more time using media than doing anything else except (possibly) sleeping. "You'd think," he says, "we'd be doing everything in our power to understand the effects,"

MANY OF these study results raise legitimate concerns, but Rich wants his efforts at publicizing them to raise hope as well. "You could say that findings like these prove that multitasking is just a distraction and we should avoid it....But you can also say, 'This is the world we live in." If today's environment is training our kids' brains differently, he says, "Let's find out how, so we can harness that power and use it."

He has connected with educational professionals around the globe, hoping that the information they find can help shape curricula. The typical American school now has one computer for every four students—and the push by policymakers to digitize schools represents a significant increase in spending per pupil. "But we don't want to have computers just for computers' sake," Rich says. Several recent studies—including one by Jacob Vigdor, Ph.D. '99, now an economics professor at Duke, have shown that youths often use home computers for entertainment rather than learning and this can hurt school performance, particularly in low-income families. "Basically, kids in less-supervised environments or in single-parent families tend to use technology to play games and chat with friends," Vigdor says. "If we don't pay close attention to how kids use technology, [the results] often add up to more distractions from schoolwork." (please turn to page 91)

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#### THE LIVING DINOSAUR

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produce successfully in regions of the Northern Hemisphere that were undergoing dramatic cooling after a long period of stable warm conditions...*Ginkgo biloba*'s temperature-sensitive embryo developmental-delay mechanism could well have been another climate-induced Cretaceous innovation—an evolutionarily primitive, but ecologically functional, form of seed dormancy." *Ginkgo* seeds do not try to grow until the weather favors their survival. Between 1953 and 2000 in Japan, the temperature-sensitive *Ginkgo* adjusted to the warming climate by extending its growing period: four days earlier each spring and eight days longer in the fall.

Like "Chinese" Wilson, Peter Del Tredici loved botanizing in China, a place he has visited eight more times and calls "Horticultural Heaven." He has worked with many Chinese colleagues, and said they have now taken the lead in researching ginkgo, a national symbol of their botanical heritage. Ginkgo DNA is three times larger than human DNA and is unlikely to be fully sequenced anytime soon, but by using smaller snippets for DNA testing in 2008, botanist Wei Gong and her colleagues confirmed Del Tredici's 1989 find of wild ginkgo growing on the slopes of Tian Mu Mountain. The Chinese also confirmed that several other small wild ginkgo remnants displayed "a significantly higher degree of genetic diversity than populations in other parts of the country." In some of these forests, growing near peoples with no history of gathering ginkgo fruits, there are young ginkgos growing. Although no one knows for sure where Ginkgo originated, it's now clear that during the Ice Age, the southwest mountains of China served as refugia. Subsequent DNA studies have also shown that China is the ultimate source of all the world's cultivated ginkgos.

Many of *Ginkgo*'s mysteries are probably unsolvable. Did it once have a pollinator? We will never truly know, said Del Tredici, "why *Ginkgo* is still around when all of its relatives have gone extinct...many of its life-history traits evolved under conditions that no longer exist, which makes reconstructing its ecological niche difficult to establish." What, for instance, he continued, were "its original dispersal agents? What role did the medically active chemicals it produces play in its evolution? Were they feeding deterrents? I assume *Ginkgo* survived because it was somehow able to remain competitive with flowering plants, but in what ways was it different from species that went extinct? For all intents and purposes, *Ginkgo* has stopped evolving."

For decades now, Del Tredici has been gathering ginkgo seeds and cuttings from historic and unusual trees, and he recently planted a large hillside in the arboretum with some of his more prized specimens, part of a larger grove of young trees that are all deciduous gymnosperms: larches, golden larches, dawn redwoods, and bald cypresses. He expects that when Harvard has to renegotiate the lease for the arboretum in 861 years, the ginkgos will be looking pretty magnificent.

Until then, when next you pass a ginkgo on a busy street, remember you are looking at a mysterious species that shared the earth with dinosaurs. "As remarkable as *Ginkgo*'s evolutionary survival is," said Del Tredici, "the fact that it grows vigorously in the modern urban environment is no less dramatic. Having survived the climatic vicissitudes of the past 120 million years, ginkgo is clearly well prepared—or, more precisely, preadapted—to handle the climatic uncertainties that seem to be looming in the not-too-distant future. Indeed, should the human race succeed in wiping itself out over the course of the next few centuries, we can take some comfort in the knowledge that the ginkgo tree will survive."

Historian Jill Jonnes, author of Eiffel's Tower, Conquering Gotham, and Empires of Light, is a scholar this fall at the Woodrow Wilson International Center for Scholars, working on trees as green infrastructure.

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Rich has advised lawyers, media creators, and Congress; although he rarely doles out specific advice or proscriptions for controlling kids' media intake, he does steer parents when they press him for his opinions. In the 1990s, he was one of several pediatricians who helped draft the American Academy of Pediatrics' (AAP) policy statement discouraging parents from allowing television- and video-watching by children under the age of two. "We know from recent research in the field that there are three major elements that optimize early brain development in children," he says: face-to-face interactions with a caretaker, interactions with the physical environment, and open-ended, creative, problem-solving play like molding clay or sitting in a sandbox. "We also know that screen media don't provide any of those things," so parents who put infants down in front of the TV are not placing them down in an environment where they could be learning more. (In its most recent statement, the AAP cited seven studies from the last decade whose findings revealed that infants younger than 18 months who are exposed to TV may suffer from a delay in language development.)

As the father of two boys under the age of seven, Rich followed

his own advice and kept them away from screens until they reached the two-year mark. But he is also careful to point out, "This doesn't mean that if you didn't, you're a horrible parent. I have children from my first marriage who are in their twenties, and I sat them down in front of screens as infants. This is not about good or bad parenting—we aren't blaming 1950s parents for not putting their kids in seatbelts. This is about giving parents the best information, so they can apply it to their own individual kids' needs."

The best advice, says Rich, is the same advice he'd have given any parent any time—even before the age of television: "*Talk* with your kids. Ask them about what they're doing, and join in when you can. And share with them *your* favorite media—books, music, movies, games, TV." After all, he points out, children left to their own devices will eat nothing but cake and cookies. Influencing their media diet is as doable as guiding their food choices. And if he and his colleagues "do our jobs," he declares, parents will have a much easier time deciphering the menu.  $\nabla$ 

Writer and television associate producer Cara Feinberg previously profiled psychologist Ellen Langer in "The Mindfulness Chronicles," published in this magazine's September-October 2010 issue.