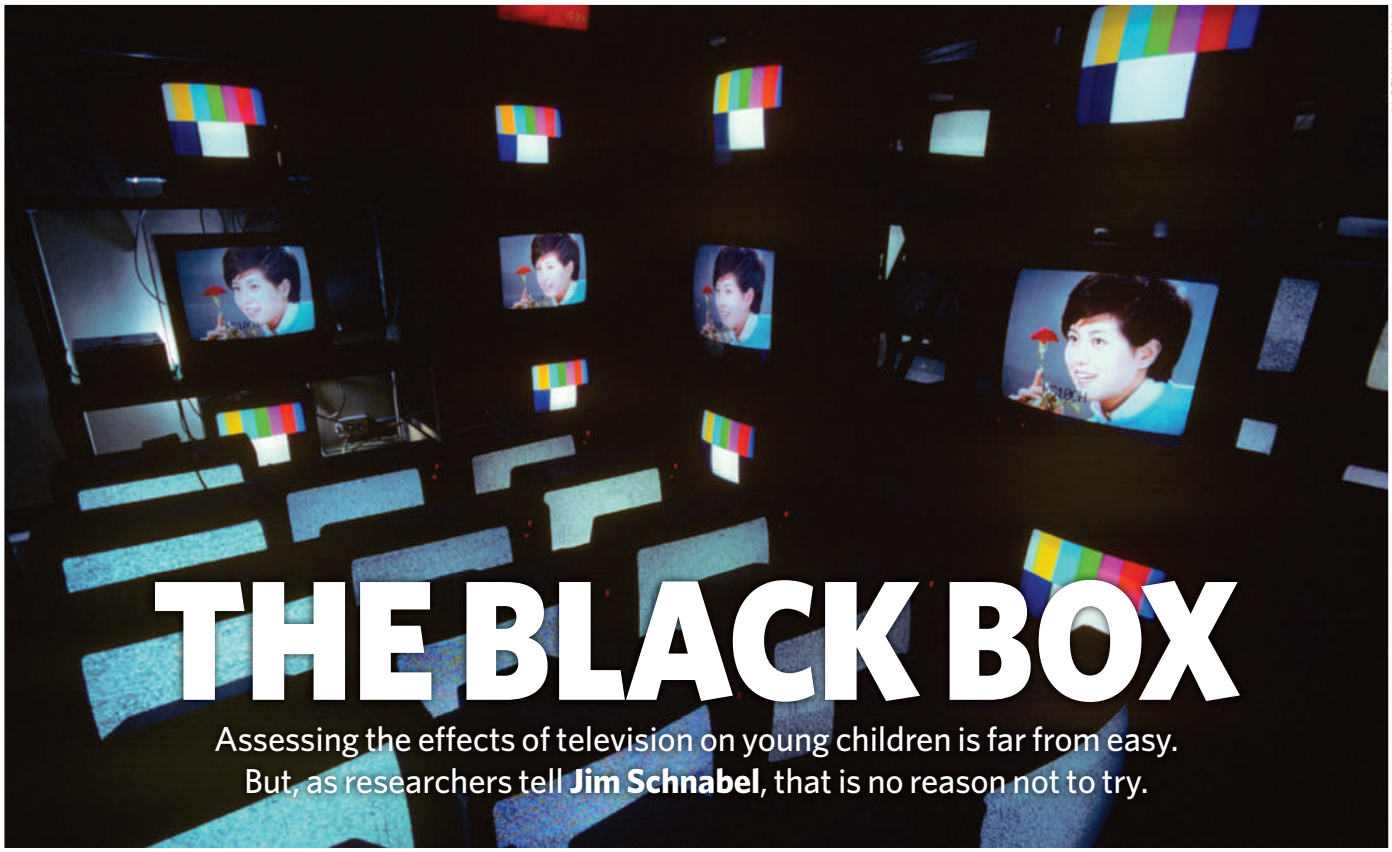


THE BLACK BOX

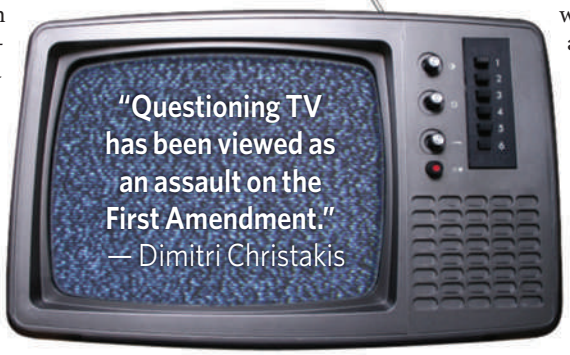
Assessing the effects of television on young children is far from easy. But, as researchers tell **Jim Schnabel**, that is no reason not to try.

In 1998, Dimitri Christakis took time off from work to care for his two-month-old son. At home he found himself watching television to pass the time — "more TV than I had ever watched in my life", he remembers. Soon he noticed that his infant son was watching too. Even CNN kept the boy glued to the screen. "Obviously he wasn't following the news," says Christakis, a professor of paediatrics at the University of Washington in Seattle.

Christakis realized that the jumpy images on the screen were engaging the child's 'orienting response', a basic attentional reflex that directs the senses towards a sudden change in the environment. He wondered about the long-term effect of this on a brain that was at such a sensitive developmental stage. Could it alter the brain to 'expect' overstimulation, so that ordinary reality would thereafter seem dull by comparison? And could such a mechanism help to explain the ongoing tsunami of attention deficit hyperactivity disorder (ADHD) diagnoses, whose rise had roughly coincided with the dramatic increase in media consumption in Western societies?

Christakis decided to try to address these questions with research. Together with several colleagues, he examined a database called the National Longitudinal Survey of Youth. After analysing some 1,300 children for whom the appropriate data were available, they found that on average, a child who had watched two hours of television per day before the age of three was 20% more likely to have attentional problems at the age of seven, compared with a child who had watched none.

Christakis and his colleagues published their results in 2004 (ref. 1). Then, working with public-health expert Fred Zimmerman, who is now at the University of California, Los Angeles, Christakis did a follow-up study[2] with a different longitudinal sample, showing that the link to later attentional problems was particularly strong for cartoons and other entertainment programmes watched before the age of three. For educational programmes, such as the gently paced US series *Mister Rogers' Neighborhood*, they found no such link.



These studies were among the largest and most persuasive ever to have linked TV to reduced attention and, as such, they made splashes in the media and the research community. But as observational studies, they had their limitations. An association between TV watching and later attention problems did not prove that one had caused the other. A host of other factors, such as the socio-economic status of a household, could also have contributed to the association, and although researchers typically try to take those other factors into account, they can't always do so accurately. So, like other scientists who had addressed this issue, Zimmerman and Christakis concluded that more research was needed.

In particular, Christakis believed that what was needed was a large-scale intervention study, a clinical-trial-type experiment in which one randomly selected group of children would be assigned to watch only a small amount of educational TV, whereas the other group would watch whatever their parents normally allowed. However, Christakis's 2006 proposal — which would have enrolled 900 children, reduced TV exposure in half of them in the first two years of life and assessed attention and related cognitive functions until the age of four — was turned down by reviewers for the US National Institutes of Health (NIH). Even now, the NIH does not have an interventional study under way or planned in this area — nor does Christakis know of one under way or planned anywhere else in the world.

This apparent lack of follow-through seems to be part of a broader phenomenon. On the one hand, there is fairly convincing evidence that some TV content, such as the widely aired *Sesame Street*, can benefit children in a certain age range. On the other, a great deal of research suggests that some TV content can be harmful — yet despite the ominous public-health implications, little seems to be done about it.

"Media are arguably the most ubiquitous environmental influence on kids' health and development," says Michael Rich, a paediatrician and media-effects researcher at Harvard Medical School in Boston, Massachusetts. "The problem is that as a society we have not seen this as enough of a health concern that we've decided to invest in it." Because work on the potential effects of media is seldom distinguished from other kinds of developmental and public-health research, it is difficult to know how much is spent on it. But Christakis estimates that the worldwide total is "below US$10 million per year".

Tuned out

Some major funding agencies just "don't think that media are as important as other factors in children's lives," says Ellen Wartella, a developmental psychologist at the University of California, Riverside. She notes that at a recent meeting of the Society for Research in Child Development, part of the US National Academy of Sciences, "out of hundreds of sessions on children, only three sessions were devoted to media effects".

Even when media-effects research is done, and its conclusions seem compelling, it appears to have little influence. For example, in at least two recent studies[3,4], researchers have tried but failed to find evidence that popular DVDs targeting infants have cognitive benefits, and one of these studies, co-authored by Christakis[3], hinted that they might even impair children's language development. Because of research like this, the American Academy of Pediatrics (AAP) discourages parents from letting infants watch TV at all. But apart from France, which last year banned infant-targeted programmes from its broadcast channels, few, if any, countries have policies that restrict infant TV. And Wartella notes that according to surveys, mothers frequently ignore the AAP's advice and don't tell their paediatricians. "They don't want to hear that they shouldn't put their child in front of the screen," she says.

Science's slight impact on media consumption extends beyond issues relating to infants. In the past two decades, researchers have found strong and consistent links between older children's exposure to certain media content and, for example, obesity, eating disorders, aggression, desensitization to violence, sexual promiscuity and the use of alcohol and cigarettes. Brian Primack, a paediatrician at the University of Pittsburgh School of Medicine in Pennsylvania who researches media effects on adolescents, says that for some of these outcomes, "I think we do have enough data [to justify] warning labels".

Studies of adolescents and younger children, meanwhile, show that their media exposure continues to expand rapidly, creating what media-effects researchers have begun to call a 'digital childhood'. Is this happening because the evidence for media's harmful effects remains sparse? Or have researchers such as Christakis found themselves up against cultural forces that they cannot defeat with evidence alone?

Dimitri Christakis assesses child development and media.

Researchers argue that a host of factors, both scientific and societal, are to blame. For one thing, researchers such as Christakis, Rich and Primack are paediatricians, yet their proposals for epidemiological-type research on the effects of childhood media are usually reviewed by developmental psychologists. Developmental research traditionally hasn't placed great emphasis on media effects amid the complexities of childhood development, says Kevin Durkin, a developmental psychologist at the University of Strathclyde, UK. Among his colleagues, he adds, "there's still a bit of a reluctance to engage with the real world and with things that [children] are actually doing on a daily basis" — and a corresponding preference for theory-driven, laboratory-based research.

Media-effects research, by contrast, has often been considered methodologically messy. Virtually all studies of potential health effects, for example, have been observational studies of real-world populations — populations before and after media exposure, or populations in which different people have different exposures. Because the groups being compared in these cases are not randomly assigned to 'watch' or 'not watch', it is at least conceivable that their differing outcomes are the result of other, perhaps hidden, factors not directly related to media exposure. "There's always going to be that question, because it's not like a randomized clinical trial," says Primack.

As he and other researchers note, the same problem once plagued researchers who wanted to show that cigarette smoking harmed people's lungs. A 'clinical trial' of smoking's health effects, in which groups of people were randomized to smoke or not smoke, would have been grossly unethical. Over time, however, researchers were able to build a case against tobacco with well-designed observational studies, for example showing a 'dose–response effect' in which heavier smoking was linked to higher cancer risk.

But although cigarette smoke is a relatively simple kind of exposure, media exposure is much harder to track. Typically, researchers have lacked the means to monitor precisely what their subjects are watching from day to day for study periods that may last months or even years. They have often relied on self-reporting or parental reports, both of which are considered unreliable. "If you ask the parents about how much TV their kid watches, they tend to overestimate, whereas the kid tends to

SEATTLE CHILDREN'S RES. INST.

Anytime, anywhere: exposure to TV is hard to measure accurately.

FROM LEFT: CARO/ALAMY; J. GREENBERG/ALAMY; T. KRUESSELMANN/ZEFA/CORBIS; PICTURE PARTNERS/ALAMY; S. RAUSSER/TAXI/GETTY; VARIO IMAGES/ALAMY; IMAGEBROKER/ALAMY

underestimate," says Rich. "One way or another the report tends to be biased."

In the past few years, Rich, Primack and others have been experimenting with other monitoring methods such as ecological momentary assessment, in which subjects or their parents report real-time data of their media exposures to researchers using cellphones, personal organizers and even camcorders.

Information overload

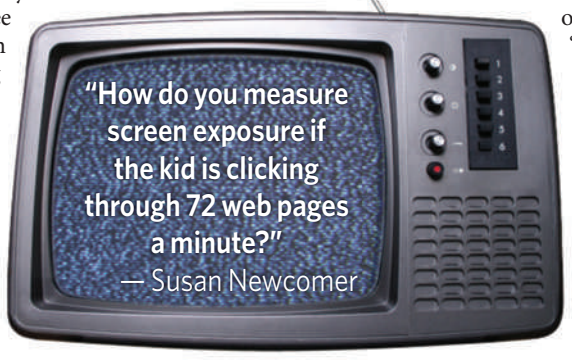
On the whole, though, technological evolution may be making it harder to study media's effects. "It's no longer the box in the middle of the living room that everybody gathers around," notes Rich. "We have screens everywhere — in our pockets, you know? I was in a hotel recently and I realized that from where I sat I could see seven screens with seven different things on them. And I wasn't even actively watching media." Similarly, notes Susan Newcomer, a programme officer who oversees some media-effects research at the National Institute of Child Health and Human Development (NICHD) in Bethesda, Maryland, "How do you measure screen exposure if the kid is clicking through 72 web pages a minute? And not just clicking through the web but also texting a friend, listening to music, all at the same time?"

Compounding this problem is the fact that even for a single, uncomplicated medium — such as one television channel — a viewer faces multiple potential influences that may be difficult, if not impossible, to tease apart. There is the stream of content within a television programme, for example, and then there are the contents of interleaved advertisements. Viewers may be affected, too, by the 'formal', non-conceptual properties of TV watching, such as the rapid image-shifts meant to trigger viewers' orienting responses. There is also the likelihood that in watching TV, a viewer will be inert on a sofa instead of exercising, sitting alone instead of socializing, and staying awake instead of sleeping — and all of these behavioural displacements have their own potential health effects.

"You're about to go to bed and you turn on the television to wind down, but then three hours have passed and you've seen *Dracula* again," says Primack, pointing out that a lack of sleep is now believed by some to contribute to obesity as well as mental-health problems.

According to James Griffin, a programme officer whose NICHD branch oversees research on infants and young children, the institute now generally prefers studies that can identify specific cognitive mechanisms of a child's interaction with media. "We are focusing more on looking at what infants and toddlers are capable of learning [from media]," he says.

In theory, interventional studies would get around many of these problems because the source and content of media could be controlled and monitored. So why not do them? "Good luck getting that past either an NIH review panel or an institutional review board," says Newcomer. Over the time needed for any effect to appear, she explains, it would be "both ethically and pragmatically a real challenge to constrain people not to look at television, for example, or to look at only certain kinds of television".



Yet Christakis argues that such intervention studies are still feasible, particularly when it comes to the effects of TV on very young children. In principle, for such children, TV watching can be more easily controlled by parents, and more easily monitored by researchers. The early developmental stage of these children also means that TV's effects may show up more quickly, thus requiring shorter studies. Without such investigations, Christakis says, "it's going to be very difficult for us to satisfactorily prove to the critics and the cynics that a particular content is harmful".

Media-effects researchers are not just fighting resistance in the scientific community. They say they face a broad cultural resistance too, one rooted in core Western beliefs — that humans have 'free will'; that they choose autonomously and rationally from the information put before them; that a free market in information is better than a restricted one.

"In the United States, questioning any aspect of television has been viewed as a direct assault on the First Amendment," says Christakis. "Tobacco researchers didn't have to deal with that issue." And the issue isn't confined to the United States. In 2005, India's government banned film images of actors using cigarettes — a known motivator for adolescents to start smoking — yet the country's High Court reversed the ban earlier this year, on free-speech grounds.

Researchers say that they confront a related problem called the 'third-person effect'. "Most people will acknowledge that TV is on balance a bad thing; they just don't think it's bad for *their* kids," explains Christakis. "Somehow they think that their kids are immune, or that the way they use TV is different." But the conceit isn't justified, Rich says, because "epidemiologic data [showing a harmful influence] are generated on our kids, not on somebody else's kids".

Media-effects researchers also say that their arguments are apt to be treated, by the public and even by other scientists, as old-fashioned arguments about the immorality of popular-media content, now dressed up as modern health issues. Yet Rich insists that the difference between moral issues and health issues is real and may be crucial in convincing people to change their media-consumption habits. "The

moral issue has helped to stalemate this," he says. "People have different value systems. But if you present them clear data that show what the effect of this media content is on that health outcome, you can get them to agree."

Even if people can agree such things on a rational level, in practice their media-consumption behaviours are deeply entrenched, as even Rich admits. "Parents do tend to say I'm sorry I need to put the kids in front of the tube so I can get the house vacuumed."

Sometimes, governments step in to break cultural stalemates, and in the United States — where the majority of media-effects research takes place — that almost happened. In 2004, Senator Joseph Lieberman (Democrat, Connecticut) introduced a bill called the Children and Media Research Advancement Act (CAMRA). Designed to remedy "the paucity of research" in this area, and enthusiastically backed by researchers including Rich and Wartella, it would have dedicated an NIH budget for media-effects studies during 2005–09, starting at $10 million per year and ending at $25 million per year — figures that would have dramatically increased the activity in this field.

The bill never made it past the committee stage. Indeed, a group called Citizens Against Government Waste criticized Lieberman, stating in a press release that his proposed effort "belittles the ability of parents to use common sense in deciding what entertainment is appropriate for their own child's consumption".

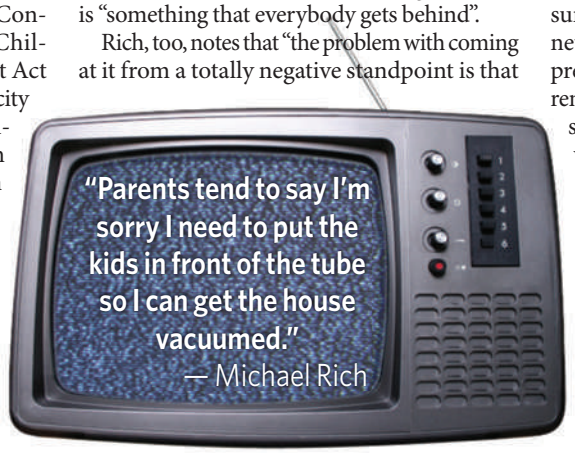
CAMRA has been reintroduced several times since then, with funding levels left unspecified. But it still has not made it into law. According to a Senate staffer who didn't want her name used, some senators have objected to the legislative determination of where NIH funds should be applied — which they say the agency has had enough of already. (A 2006 version would have placed the programme with the Centers for Disease Control and Prevention in Atlanta, Georgia.) Other legislators simply have not wanted to spend the money, although on an annual basis that money would have amounted only to the cost of a few episodes of a hit TV show.

"That in a nutshell is our societal ambivalence towards this subject," says Rich.

Accentuate the positive

Last year, Christakis was able to get a media-effects study funded by the NICHD. Just starting now, the project will look at the effects on preschool children of changing TV content rather than eliminating it. "We're trying to get them to watch less aggression and more prosocial programming," says Christakis. "But we're not telling them to watch less; we just want them to watch better TV." The pro-TV message, he adds, is "something that everybody gets behind".

Rich, too, notes that "the problem with coming at it from a totally negative standpoint is that people just check out". He urges a greatly expanded research base "that tells us how to live with media, because we're going to have to one way or another". He also foresees that media use will change, albeit 'generationally', as it did with cigarettes. As evidence accumulates that TV can cause health or behavioural problems, he predicts, certain kinds of media use may start to be seen by youngsters and their parents not as forbidden pleasures but as "just dumb".



Christakis is less sanguine. He stopped his own kids from watching TV until the age of two and now places modest restrictions on their Internet use. He worries that, in addition to its functional entrenchment in people's daily lives, a lot of media content might be physiologically addictive — perhaps less so than nicotine-laden cigarettes, but with a much larger susceptible population. "I think there's a biochemical response to that kind of stimulation, that instant gratification, that rush, which isn't very well understood," he says. "And I think there's a sense in which some people are very reluctant to acknowledge that there's a problem, because they also suffer from it."

Although the concept of behavioural as opposed to drug-induced addiction is still somewhat controversial in Western countries, it is less so in South Korea and Japan. The exposure to electronic media, especially the Internet, seems to be greater there, and the reported prevalence of related addiction behaviours is remarkably high[5]. Christakis suspects that those societies may be "the canary in the coal mine" when it comes to media addiction.

One advantage researchers had in studying the effects of cigarette smoking was that, even if they couldn't experiment directly on humans, they could do so on animals. Christakis now hopes to remove that advantage. This summer he will begin tests on a rodent model of media exposure, comparing rats raised in a 'hyperstimulating' environment of fast-changing sounds and lights, with those raised in a quiet setting, and looking at outcomes relating to attention and addiction. "Animal studies have their limitations," he says. "But they have their strengths too, because you can totally control the animal. You can drill down, so to speak, to a level you could never do in humans." ■

Jim Schnabel is a freelance writer based in Maryland.

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