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NEUROBIOLOGICAL RESEARCH AND THE IMPACT OF MEDIA

HEARING

BEFORE THE

SUBCOMMITTEE ON SCIENCE, TECHNOLOGY, AND SPACE

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

ONE HUNDRED EIGHTH CONGRESS

FIRST SESSION

APRIL 10, 2003

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ONE HUNDRED EIGHTH CONGRESS

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NEUROBIOLOGICAL RESEARCH AND THE IMPACT OF MEDIA

THURSDAY, APRIL 10, 2003

U.S. SENATE,
SUBCOMMITTEE ON SCIENCE, TECHNOLOGY, AND SPACE,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The Subcommittee met, pursuant to notice, at 2:30 p.m. in room SR–253, Russell Senate Office Building, Hon. Sam Brownback, Chairman of the Subcommittee, presiding.

OPENING STATEMENT OF HON. SAM BROWNBACK, U.S. SENATOR FROM KANSAS

Senator BROWNBACK. Good afternoon, we will call the hearing to order. It is a pleasure to be here today to discuss an important public health issue. We are honored to have a distinguished panel of witnesses. I appreciate your presence and all of your hard work in this arena over the years.

We will discuss today the potential impact of the media on children's health, and on the opportunity for neuroscience and neurobiological research to give us additional tools and information as we explore this issue. This is simply a conversation about what sort of cultural environment we wish to provide for our children and the information we need to provide to their parents.

There is a growing body of hard and verifiable evidence that suggests the violent and sexual content of entertainment media can be harmful to children's development. Most of the studies and reviews by Government and professional health organizations showed a relationship stronger than many proven associations, such as secondhand smoke and lung cancer, or calcium intake and bone density. The studies plainly demonstrate links between early exposure to entertainment violence and aggressive attitudes and behaviors, increased levels of violent crime against others, and desensitization to real-life violence.

Recent studies, such as Professor Murray's brain mapping, have only furthered this research with more intriguing hypotheses, such as indicating that viewing made-up violence affects us physically the same way that viewing real violence does, registering in the areas of our brain that store long-term memories of traumatic events.

Meanwhile, our children are exposed daily to heavy doses of violence through their broad access to media—all at an age when their minds and values are being formed and they are developmentally incapable of distinguishing fantasy from reality.

Even many adults have problems distinguishing fantasy from reality. For example, how many times have adults confused television actors and the characters they play? Look at some classic shows, like "Dr. Kildare". It received thousands of letters a week from adults seeking medical advice. That is why the famous television ad had to come up with the tag line, "I'm not a doctor, but I play one on television."

This is a national issue, one that affects all of us. This is clearly illustrated by a recently-released University of Michigan study that presents some of the most powerful and compelling evidence on the subject of television violence. This longitudinal study, where the researchers followed the same children and tracked the effects years later, discovered that exposure to media violence during childhood directly predicts young adult aggressive behavior for both males and females. This is true even when the effects of socioeconomic status, intellectual ability, and a variety of parenting factors are controlled. That is a stunning conclusion. In other words, contrary to our previous notions, violence does not discriminate who it affects, regardless of one's social standing, intellectual capabilities, or family conditions.

Now, think about it. Scientific research is clearly showing that watching violence makes people more violent—and not just at the time they watch the violence, that is, not just on the schoolyard as children, but years later, as adults. Many of us are already concerned about our society and our culture today—what happens when this generation grows up?

We must understand the powerful public impact of entertainment media. It plays a role in every part of our lives, affecting us whether we realize it or not. Through television, movies, the Internet, and more, the media helps shape our attitudes and assumptions—it influences and, in many ways, creates our decisions and behavior.

In this time of war, there is another key point we cannot ignore: our entertainment media have a worldwide influence. American movies, television shows, music, and video games are popular exports. American entertainment is the most pervasive and loudest ambassador we have. Unfortunately, its message is too often destructive—and incorrect.

As a member of the Senator Foreign Relations Committee, I have seen this far too often—and two researchers in Boston recently proved this point clearly. In a Boston University survey entitled, "The Next Generation's Image of Americans," teenagers from 12 countries responded that they—though only 12 percent had ever visited America—considered Americans to be violent, prone to criminal activity, and sexually immoral. The key to their opinions? Their self-confessed exposure to American television, movies, and pop music. Watching some of the entertainment of today, it is no wonder they have this view.

It is why this hearing is a particular critical event and why it is especially important to fund additional research now. The best way to determine what impact the popular culture has on our attitudes and behavior, what influence our culture exerts, is to do what we are doing today—to encourage research discussion, to discover new evidence, and possible new solutions.

We must continue to spread the message that the content of our media is a *serious* public health concern. The risks to our children, ourselves, our society, and, most important, our future are unpredictable and incalculable. Therefore, we must continue to analyze, evaluate, study, research, and, oftentimes, criticize these products and their effects. These actions are not only compatible with a free society and liberty, but essential to their very survival.

We will discuss and have presentations today by researchers both in the field of the overall impact of the media on children, as well as those doing work in the recent area of brain mapping, which looks at what is happening to a child's mind when they are entertained with violence.

We are delighted to have our witnesses here today to present on this important topic. In the first panel, we will have Dr. Joanne Cantor, a professor, University of Wisconsin, Madison; Dr. Dale Kunkel, University of California at Santa Barbara, Washington Center, in Washington, D.C.; and Dr. Michael Rich, director of the Center on Media and Child Health at Harvard University, and the Children's Hospital in Boston.

Dr. Rich will be introducing the various panel members and some of their work to pull it together. So I would like to go to you first, Dr. Rich, in this presentation. To make it clear to people what we are after, it is to get the scientific basis for what a number of us have felt for a long period of time, which is that what our children are consuming for entertainment is harmful to them when it has levels of violence and sexual material that distort their life and what they are doing with their lives.

Dr. Rich, you have appeared before me before in different settings. I am always delighted to see you, and I appreciate your groundbreaking work. Thanks for being here today.

STATEMENT OF MICHAEL RICH, M.D., MPH, DIRECTOR, CENTER ON MEDIA AND CHILD HEALTH, CHILDREN'S HOSPITAL BOSTON

Dr. RICH. Thank you, Chairman Brownback. And thanks to the Committee for the opportunity to testify to you today as a pediatrician, as a child health researcher, as a media producer, and as a parent.

My name is Dr. Michael Rich, and I am a doctor, but don't play one on TV. I practice pediatrics and adolescent medicine at Children's Hospital Boston, and I teach at Harvard Medical School and Harvard School of Public Health. I am the director and co-founder of the Center on Media and Child Health at Harvard University.

The first of its kind, the Center on Media and Child Health is a multidisciplinary collaboration between scientists at Harvard Medical School, Harvard School of Public Health, and the Harvard Graduate School of Education, as well as colleagues around the country, such as those I am speaking with today, to work together dedicated to research, education, clinical implementation, and media production based on the findings about the effects of media on the physical and mental health of children and adolescents.

Finally, and most importantly, I am the father of a 16-year-old daughter and a 14-year-old son.

One hundred years ago, the leading causes of illness and death in children were infectious diseases and congenital anomalies. Physicians tried, often unsuccessfully, to cure those afflicted. More successfully, they, along with public health workers and other scientists, sought to prevent those problems by discovering and intervening on the causes, many of which were found to be environmental—poor sanitation, crowded housing, and pollution.

Today, with the hygienic infrastructure, antibiotics, and high-technology prenatal care, diarrhea, pneumonia, and birth defects are no longer significant causes of morbidity and mortality in young people. Now the greatest threats to the health and well-being of children and adolescents are the outcomes of acquired health-risk behaviors—violence, substance use, sexual-risk behaviors, and nutritional problems ranging from obesity to eating disorders.

Surveys that have asked young people where they get their information on health, lifestyles, and relationships have consistently found that entertainment media are cited as one of the leading sources. Just as environmental causes of disease and death were discovered and addressed a century ago, we must examine the environment in which our children are developing in the Information Age to determine the causes of these new morbidities.

The medical community first voiced concern about the effects of media on child health in the early 1950s, shortly after the introduction of television to the general public. Since that time, media technologies have grown exponentially in variety, in sophistication, and in the potency of the effects on their users. Similarly, the level of concern about and research into media effects has grown. It has been estimated that there are thousands of research studies conducted by scientists of public health, psychology, sociology, and communications to investigate whether there is evidence of media exposure having an effect on health outcomes.

In approaching any problem of public health, it is important to deal with it systematically so that key information is not missed and a complete picture of the disease process is established. An epidemiologist attempting to determine the causes and possible solutions for an epidemic examines the problem through four key aspects of the disease process:

Exposure. What is the nature and magnitude of the exposure to the potential causal agent?

Effects. What is the effect of that agent on the exposed individual?

Mechanism. What is the mechanism by which the causal agent affects the individual?

And intervention. What interventions can cure or prevent the negative health outcomes?

Research to date on the effects of entertainment media on the physical and mental health of children has concentrated largely on the first two of these areas, exposure and effects. Through the years, research has shown increasing exposure to television, movies, electronic games, the Internet, and popular music.

A nationwide study in 1999, conducted by Dr. Dale Kunkel, among others, found that American children between 8 and 18 years of age spend 6 hours and 43 minutes of every day exposed

to media, more time than they spend in school, with parents, or, indeed, engaged in any other activity except sleeping. When media were used simultaneously—listening to music while surfing the Internet, for example—were cumulatively calculated, the amount of media exposure rose to 7 hours and 57 minutes, just under 8 hours a day.

There is little question that young people's level of media exposure provides ample opportunity for the content of those media to affect the attitudes, thoughts, and behaviors of young people. Since we know that children learn even the simplest skills, such as using a spoon, by observation, imitation, and adoption of behaviors as their own, what are they learning from television, movies, popular music, and electronic games?

Effects research has taken a variety of approaches, from laboratory experiments exposing subjects to various types of media and observing their responses, to natural experiments where researchers could study people and their behavior before and after media were introduced into their environments, to correlational studies where large populations were studied for media exposure and subsequent health-related behaviors.

The work of Dr. Joanne Cantor has shown that children are frightened and traumatized by images they see on the news and in entertainment programming. This fear appears to be cumulative and lasting, resulting in what some researchers have termed "the mean-world syndrome" in which the child perceives the world as a dangerous and frightening place, one in which only the strong survive.

In my clinical experience, this plays itself out in sleep disturbance, nightmares, anxiety, depression, and even symptoms of post-traumatic stress disorder in children as young as four or five years.

Natural laboratories created when discrete populations have media introduced for the first time have shown 160 percent increases in aggression and 50 percent increases in distorted eating behavior after the introduction of media.

The vast majority of correlational studies done on media violence have shown a positive association between exposure to media violence and increases in aggressive attitudes, thoughts, and behaviors. Children who watched a lot of television when they were young have been found to be more aggressive years later as adolescents and adults, whether they are male or female, and even when such factors as baseline aggressive tendencies, socioeconomic status, and a variety of parenting factors are controlled for.

The findings of hundreds of studies analyzed as a whole have shown that the association between television exposure and aggressive behavior is stronger than that between calcium intake and bone mass, lead ingestion and lower IQ, condom non-use and sexually acquired HIV, or environmental tobacco smoke and lung cancer, all associations that clinicians accept as fact and on which preventive medicine is based without question.

Despite the preponderance and strength of findings that associate media exposure with increased aggression, fears, and desensitization to violence, the mechanism by which media actually changes those who are exposed remains unclear. Without a step-by-step understanding of how viewed violence is translated into

perceptions, attitudes, and behaviors, the media exposure and effects research remains open to criticism.

Convincing as it is to those of us who make the care and concern for children's health our day-to-day business, there are well-funded challenges to this research. Just as the powerful correlational evidence linking tobacco smoke with lung cancer was challenged until researchers were able to demonstrate carcinogenic changes on a cellular level in response to tobacco exposure, research on the effects of media on health must examine the biological basis for behavioral change.

Recent advances in medical technology now allow us to examine the human brain at work. Functional magnetic resonance imaging, or fMRI, is an advance in neuro-imaging that allows us to observe the brain in real time to see what areas of the brain are active in response to various stimuli and how those responses move from area to area in the brain. In short, we are now able to visualize the activity of the brain as it processes and stores information. Coupling these images with our ever-increasing knowledge of brain architecture and function, we can construct the pathways by which stimuli are received, synthesized into ideas, categorized and stored for future reference—in short, how we learn from our environment.

We are privileged today to have the opportunity to hear from two pioneers of the new field of media effects neuro-imaging, Dr. John Murray and Dr. Dan Anderson. I will leave the detailed description of findings of their pilot studies to them.

However it must be noted that this work is not isolated to a small group of scientists examining the effects of media. The cover story of the February 24, 2003, Newsweek entitled "Anxiety and Your Brain: How Living With Fear Affects the Mind and Body" details the high level of concern held by clinicians and by the public alike, that we are changed and damaged by the stress of war, terrorism, and even our entertainment. It describes how anxiety, even among very young children, has become the most common chronic illness of modern society, the effects of which influence every waking moment and pervade virtually every human interaction.

The response of the human brain to stress, regardless of its source, is universal and primitive. To quote briefly from the Newsweek article, quote, "The fear system's command center is the amygdala . . . An activated amygdala does not wait around for instructions from the conscious mind. Once it perceives a threat, it can trigger a body-wide emergency response within milliseconds . . . Stress hormones then shut down non-emergency services, such as digestion and immunity, and direct the body's resources to fighting or fleeing . . . creating a state of heightened awareness and supercharging the circuitry involved in memory formation."

When we entertain ourselves with scary movies or violent video games, we are attracted to the heart-pounding super-alert excitement that these products stimulate. We are activating the very same primitive survival circuits, the fight-or-flight pathways in the brain, that allowed our ancestors to survive sabertooth tigers. However, we also may be paying a long-term price for this excitement by acquiring deep-seated, primitive, almost reflexive responses to conflict, responses that may be playing themselves out years later

in physical and mental stress, desensitization to the suffering of others, and aggression.

Since 1972, comprehensive reports from the Surgeon General of the United States and the National Institute of Mental Health have indicated widespread concern among the public-health community about the effects of media exposure on our physical and mental health. In the year 2000, the major health associations in the United States—the American Medical Association, the American Academy of Pediatrics, the American Psychological Association, and the American Academy of Child and Adolescent Psychiatry—issued a consensus statement calling media violence a public health emergency, indicating that the research evidence pointed, quote, "overwhelmingly to a causal connection between media violence and aggressive behavior in some children."

Technology and scientific innovations have now given us the research tools to examine the mechanism of this causation. As a researcher, a teacher, a pediatrician, and a parent, I urge us all to support and apply brain-mapping research for the benefit of our children and our society. I look forward to what we can learn by better understanding how the human brain responds to media and by developing interventions to protect us from negative media influences, completing the last two areas of epidemiological research needed to characterize and respond to this public health emergency.

It was not so long ago that, while the tobacco industry criticized and attempted to debunk scientific minutiae of various research findings, the medical community and society at large recognized the serious health effects associated with smoking and began to intervene. Look at how our personal attitudes and behaviors, our social environments, and our public-health awareness have changed for the better.

We are at a similar crossroads in relation to media effects on health. It is time to be honest with ourselves, to examine the scientific evidence with all the tools at our disposal, to acknowledge the risks, and to address them in a serious and responsible manner. Entertainment media are not inherently dangerous. They are a powerful tool that must be used thoughtfully and wisely. Just as the same shovel can be used to hit someone over the head or to prepare a field for planting, so, too, media can harm or help. What we teach our children today will determine not only their long-term health and well-being, but the world that they create for all of us tomorrow. It is our task, as parents, as citizens, and as compassionate people, to do what we can to teach children the lessons that will help them make their world safe, healthy, and free.

Thank you.

[The prepared statement of Dr. Rich follows:]

PREPARED STATEMENT OF MICHAEL RICH, M.D., MPH, CENTER ON MEDIA AND CHILD HEALTH, CHILDREN'S HOSPITAL BOSTON

Chairman Brownback, Senator Breaux, Members of the Subcommittee on Science, Technology and Space, thank you for the opportunity to testify before you today as a pediatrician, as a child health researcher, as a media producer, and as a parent. My name is Dr. Michael Rich. I practice pediatrics and adolescent medicine at Children's Hospital Boston and teach at Harvard Medical School and Harvard School of Public Health. I am the director and co-founder of the Center on Media and Child

Health at Harvard University. The first of its kind, the Center on Media and Child Health is a multidisciplinary collaboration between scientists at Harvard Medical School, Harvard School of Public Health, and Harvard Graduate School of Education and colleagues around the country that is dedicated to research, education, clinical implementation, and media production based on findings about the effects of media on the physical and mental health of children and adolescents. Finally, and most importantly, I am the father of a 16-year-old daughter and a 14-year-old son.

The Effects of Media on Child Health

One hundred years ago, the leading causes of illness and death in children were infectious diseases and congenital anomalies. Physicians tried, often unsuccessfully, to cure those afflicted. More successfully, they, along with public health workers and other scientists, sought to prevent these problems by discovering and intervening on the causes—many of which were found to be environmental—poor sanitation, crowded housing, and pollution. Today, with a hygienic infrastructure, antibiotics, and high technology prenatal care, diarrhea, pneumonia, and birth defects are no longer significant causes of morbidity and mortality in young people. Now the greatest threats to the health and well-being of children and adolescents are the outcomes of acquired health risk behaviors—violence, substance use, sexual risk behaviors, and nutritional problems from obesity to eating disorders. Surveys that have asked young people where they get their information on health, lifestyles, and relationships have consistently found that entertainment media are cited as one of the leading sources. Just as environmental causes of disease and death were discovered and addressed a century ago, we must examine the environment in which children are developing in the Information Age to determine the causes of the new morbidities.

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later in physical and mental stress, fears, desensitization to the suffering of others, and aggression.

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It was not so long ago that while the tobacco industry criticized and attempted to debunk scientific minutiae of various research findings, the medical community and society at large recognized the serious health risks associated with smoking and began to intervene. Look at how our personal attitudes and behaviors, our social environments and our public health awareness have changed for the better. We are at a similar crossroads in relation to media effects on health. It is time to be honest with ourselves, examine the scientific evidence with all the tools at our disposal, acknowledge the risks, and address them in a serious and responsible manner. Entertainment media are not inherently dangerous. They are a powerful tool that must be used thoughtfully and wisely. Just as the same shovel can be used to hit someone over the head or to prepare a field for planting, so, too, media can harm or help. What we teach our children today will determine not only their long-term health and well-being, but the world they create for all of us tomorrow. It is our task, as parents, as citizens, and as compassionate people, to do what we can to teach our children the lessons that will help them make their world safe, healthy, and free.

Senator BROWNBACK. That was an excellent statement, Dr. Rich. I would note that over the years that you and I have been working on this, and you have been in and testified, that each step along the way gets clearer and clearer about what is taking place here. I am hopeful we can make that message clear, as well, across into the industry.

Dr. Kunkel, thank you very much for joining us today, and I look forward to your testimony.

STATEMENT OF DR. DALE KUNKEL, UNIVERSITY OF CALIFORNIA, SANTA BARBARA

Dr. KUNKEL. Thank you. Good afternoon, Mr. Chairman.

With the help of a number of fine colleagues, including several who are here with us today, I have conducted extensive research on media content and effects over the years emphasizing the study of both violence and sex in mainstream television programming. In my remarks today, I am going to briefly review some key issues in these areas and then offer comments about the implications that they hold for the pursuit of neurological investigations for the further study of media effects.

First, it is well established by a compelling body of scientific evidence that television violence poses a risk of harmful effects for children. While exposure to media violence is not necessarily the most potent factor that contributes to real-world violence and aggression, it may well be the most pervasive. Millions of children watch 20 or more hours per week of programming that, on average,

contains violence, and this cumulative exposure to violent images can shape young minds in unhealthy ways.

My particular research interest has emphasized the importance of examining differences in the ways in which violence is presented on television and the implications that such differences hold for the effects of that violent material.

The most important finding across this entire program of research is rather simple. Not all violence is the same, in terms of its risk of harmful effects on children. The nature and context of the portrayal matters. This idea is best conveyed by offering some examples.

First, consider a violent act that has the following features. One, it is committed by a repugnant character who no one would wish to emulate. Two, it clearly depicts the harms suffered by victims. And, three, it results in clear and strong negative consequences for the perpetrator. This type of portrayal would actually minimize the risk of most harmful effects for children, because it does not glamorize or sanitize its depiction of violence.

In contrast, consider an alternative example. In this portrayal, one, violence is committed by an attractive or popular character who is a potential role model for children. Two, the scene depicts unrealistically mild harm to the victim without presenting any pain cues. And, three, the use of violence conveys power and status for the perpetrator or attracts the approval of others in the program. This example, by glamorizing and sanitizing the depiction of violent behavior, has a much stronger risk of leading to harmful outcomes in child viewers.

Research conducted by myself and colleagues at UC Santa Barbara as part of the National Television Violence Study documents an unfortunate trend in the context surrounding most violent depictions on TV. Our final report for that project, which was based on the analysis of roughly 10,000 programs that were sampled across three television seasons, concluded that the manner in which most violence is presented on television actually enhances, rather than diminishes, its risk of harmful effects on children.

More specifically, we found that most violent portrayals on television do not show a realistic degree of harm for victims, do not show the pain and suffering realistically associated with violent attacks, and do not show the serious long-term negative consequences of violence. These patterns were found in a large majority of violent portrayals across all channels and at all times of day. In contrast, programs that include a strong anti-violence theme accounted for less than four percent of all shows that contained violent content.

These data are troubling, but they are not new. I mention them here today for two purposes. First, they serve to underscore that the way in which most violence is depicted on television does, indeed, pose a serious risk of harm for our children. But, second, and speaking more directly now to the focus of today's hearing, these data provide a potential avenue for exploration by researchers examining the neurological activity that occurs when humans view televised violence.

Given the knowledge we already possess about the varying risks of harm associated with different types of violent depictions, it

seems clear that neurobiological researchers will need to employ many different types of violent stimuli as part of their experimental work. We cannot assume that the way the mind reacts to one type of violent portrayal will be the same as for all types of violent depictions. Indeed, given our current state of knowledge, there is substantial reason to expect that would not be the case.

This underscores the need for a substantial program of research to adequately explore the full range of differences in the depictions of violent behavior. I am testifying ahead of Dr. Murray, but when he presents his perspective on this issue in his existing studies, you will see that he is already saying that we need to go to different types of subjects. My point is that we need to go to different types of portrayals of violence to understand the way in which the mind is making sense of violent portrayals.

Finally, I should note that Dr. Murray's initial brain-mapping research suggests that cortical arousal is an important aspect of how the mind reacts to violent images. This is important, because heightened arousal levels are associated with a heightened probability of behavioral effects from media exposure.

It will be interesting to learn the extent to which sexually-related material on TV may also stimulate cortical arousal. Should that be the case, then we would also have reason to expect an increased probability of exposure effects in that realm of media content, as well.

In sum, we know a great deal about the effects of media, but we still have much to learn. I encourage this Committee to take every step possible to support research that will further our knowledge about how the mind is influenced by media portrayals.

Children today spend more time with media than they do in the classroom, yet the number of Federal dollars devoted to educational research literally dwarfs that which is invested in any media-effects investigation. The stakes are too high for us to miss any opportunity to better understand the impact of media on children.

Thank you very much for your time and your attention to this important issue.

[The prepared statement of Dr. Kunkel follows:]

PREPARED STATEMENT OF DR. DALE KUNKEL, UNIVERSITY OF CALIFORNIA, SANTA BARBARA

Thank you for the opportunity to testify today on the prospects for new and important research knowledge about media effects that may be derived from the use of neurological investigations, or so-called "brain mapping" technology. I have conducted extensive research on media content and effects over the past 20 years, emphasizing the study of violent and sexually-related images found in mainstream television programming. More specifically, I served as a senior researcher from 1994–1998 on the National Television Violence Study, one of the largest media research projects to date—and I have also conducted an ongoing series of content analysis investigations entitled "Sex on TV" sponsored by the Henry J. Kaiser Family Foundation over the past six years. Each of these topic areas have important linkages to the new research approach being pioneered by Dr. Murray, and I would like to comment on those linkages after first providing some background regarding the existing state of media violence research.

Media Violence: The Importance of Context

Concern on the part of the public and Congress about the harmful influence of media violence and other sensitive material on children dates back to the 1950s and 1960s. The legitimacy of that concern is corroborated by extensive scientific research that has accumulated since that time. Indeed, in reviewing the totality of empirical

evidence regarding the impact of media violence, the conclusion that exposure to violent portrayals poses a risk of harmful effects on children has been reached by the U.S. Surgeon General, the National Institutes of Mental Health, the National Academy of Sciences, the American Medical Association, the American Psychological Association, the American Academy of Pediatrics, and a host of other scientific and public health agencies and organizations.

In sum, it is well established by a compelling body of scientific evidence that television violence poses a risk of harmful effects for child-viewers. While exposure to media violence is not necessarily the most potent factor contributing to real world violence and aggression in the United States today, it is certainly the most pervasive. Millions of children spend an average of 20 or more hours per week watching television, and this cumulative exposure to violent images can shape young minds in unhealthy ways.

Much of my research has emphasized the importance of examining differences in the ways in which violence is presented on television, and the implications such differences hold for the effects that result from viewing violent material. *Simply put, not all violence is the same in terms of its risk of harmful effects on child-viewers.* The nature and context of the portrayal matters. For example, consider a violent act that has the following features:

—it is committed by a repugnant character who no one would wish to emulate;

—it clearly depicts the harms suffered by victims;

—and it results in strong negative consequences for the perpetrator.

This would be the type of portrayal that would actually minimize the risk of most harmful effects for viewers, because it does not glamorize or sanitize its depiction of violence. In contrast, consider another type of violent portrayal;

—one that is committed by an attractive or popular character who is a potential role model for children;

—that depicts unrealistically mild harm to the victim who is attacked,

—and that conveys power and status for the perpetrator or attracts the approval of others in the program.

This type of portrayal, by glamorizing and sanitizing the depiction of violent behavior, has a much stronger risk of leading to harmful outcomes in the viewer.

Research conducted by myself and colleagues at UC Santa Barbara as part of the *National Television Violence Study* documents an unfortunate trend in the context surrounding most violent depictions on TV. Our final report, which was based on the analysis of approximately 10,000 programs across three television seasons, concluded that the manner in which most violence is presented on television actually enhances rather than diminishes its risk of harmful effects on child-viewers. That is, the most common pattern associated with violent portrayals on TV involved contextual features such as:

—not showing a realistic degree of harm for victims;

—not showing the pain and suffering realistically associated with violence attacks;

—and not showing the serious long-term negative consequences of violence.

These patterns were present in the large majority of violent portrayals across all channels, and at all times of day. In contrast, programs that included a strong anti-violence theme accounted for less than 4 percent of all shows containing violent content.

Implications of the Findings

These data are troubling, though they are not new. I mention them here today for two purposes. First, they serve to underscore that the way in which most violence is depicted on television poses a serious risk of harm for children. It does not *have* to be that way. Independent of whether or not violence on television might be reduced in quantity, it could certainly be presented in more responsible fashion, thereby diminishing its risk to child viewers. This is an avenue for addressing the concern about media violence that, in my view, has not yet been adequately explored.

But second, and now speaking more directly to the focus of today's hearing, these data provide a potentially fruitful avenue for further exploration by researchers who examine the neurological activity that occurs when humans view televised violence. In a moment, Dr. Murray will review his brain mapping research, which holds strong promise for furthering our understanding of how the mind makes sense of violent images on the screen. Given the evidence we already possess about the vary-

ing risk of harms associated with differing types of violent portrayals, it seems clear that it will be important for neurobiological researchers to employ many different types of violent stimuli as part of their experimental work. We cannot assume that the way the mind reacts to one type of violent portrayal will be the same for all types of violent depictions; indeed, given our current state of knowledge, there is strong reason to expect that it will not. This factor underscores the need for a substantial program of research to adequately explore the full range of differences in the depictions of violent behavior.

Finally, I should note that Dr. Murray's initial brain-mapping research suggests that cortical arousal is an important aspect of how the mind reacts to violent images, which is important because heightened arousal levels are associated with a heightened probability of behavioral effects from media exposure. It will also be important to learn the extent to which sexually-related material on television may stimulate cortical arousal. Should that be the case, these findings would also hold similar implications for an increased probability of exposure effects in this realm.

In sum, we know a great deal about the effects of media, but we still have much to learn. I encourage this Committee to take every step possible to support research in this area that will further our knowledge about how the mind is influenced by media portrayals.

Children spend more time with media than they do in the classroom, yet I the number of federal dollars spent on educational research today literally dwarfs that which is devoted to media effects investigations. The stakes are too high for us to miss any opportunity to better understand the impact of media on children. Thank you for your time and for your attention to this important issue.

Senator BROWNBACK. Thank you, Dr. Kunkel. That last point was an excellent one. People spend so much time with entertainment, and yet we spend very few dollars on researching its actual impact, and we do millions, if not billions of dollars worth of research on educational impact. It is an excellent point.

Dr. KUNKEL. That is important, too, but we cannot forget about this area.

Senator BROWNBACK. Agreed.

Dr. Cantor, thank you for joining us today.

STATEMENT OF JOANNE CANTOR, PH.D., PROFESSOR EMERITA, UNIVERSITY OF WISCONSIN–MADISON

Dr. CANTOR. Thank you. Mr. Chairman, thank you for inviting me to present my views on the media's impact on children.

Since 1974, I have been a professor at the University of Wisconsin focusing the greater part of my research on the impact of media violence on children's aggressive behaviors and emotional health. My book, "Mommy, I'm Scared: How TV and Movies Frighten Children and What We Can Do to Protect Them," helps parents shield their children from the effects of media violence. Finally, and not the least important in terms of expertise, I am the mother of a 14-year-old son.

We know a lot about the effects of media violence. Study after study has found that children often behave more violently after watching media violence. The violence they engage in ranges from trivial aggressive play to injurious behavior with serious medical consequences. Children also show higher levels of hostility after viewing violence. And the effects of this hostility range from being in a nasty mood to an increased tendency to interpret a neutral comment or action as an attack. In addition, children can be desensitized by media violence, becoming less distressed by real violence and less sympathetic with victims. Finally, media violence makes children fearful, and these effects range from a general sense that

the world is dangerous to full-blown anxieties, nightmares, sleep disturbances, or other trauma symptoms.

Even more alarming, research confirms that these effects are long-lasting. You talked about a study from the University of Michigan which showed that viewing violence between the ages of 6 and 10 predicts antisocial behavior as a young adult. Another aspect of that study showed that those who were heavy viewers when they were young were twice as likely as the others to engage in spousal abuse when they became adults. And, as you said, this analysis controlled for many of the other factors that we know also lead to antisocial behavior.

The long-term effects of media on fears and anxieties are also striking. Research shows that intensely violent images often induce anxieties that linger, interfering with sleeping and waking activities for years. Many young adults report that frightening media images that they saw as children have remained on their minds in spite of their repeated attempts to get rid of them. They also report feeling intense anxieties in non-threatening situations as a result of having been scared by a movie or television program, even though they now know that there is nothing to fear. As an example, you might find it logical that many people who have seen the movie "Jaws" worry about encountering a shark whenever they swim in the ocean. But you would be surprised to learn how many of these people are also still uncomfortable about swimming in lakes or pools because of the enduring emotional memory of the terror they experienced viewing this movie as a child.

Senator BROWNBACK. That is where that comes from.

[Laughter.]

Dr. CANTOR. These long-term reactions of increased aggressiveness and lingering fear raise important questions about the processes involved in these media effects. The fact that a child might imitate a wrestling move he has just seen on TV is not that surprising. Nor is it difficult to explain why a youngster might have a nightmare the night after watching "Psycho" or "Poltergeist" or "Scream." But the fact that the negative effects of media violence are so enduring indicates that we need to explore these processes more deeply. We need to know what is happening to children's brains as they watch media violence and what kind of lasting changes occur.

Some encouraging findings are beginning to emerge from research teams headed by John Murray at Kansas State University and also by Vincent Matthews at Indiana University Medical School, with funding from the Center for Successful Parenting. By mapping the areas of the brain that are influenced by violent images, these studies promise to help us understand how media violence promotes aggression and to help explain why it has such enduring effects on emotional memory.

What can Government do about the problem of media violence? Well, you have already helped by mandating the V-chip and providing TV ratings. This is an enormous first step. However, there is evidence that the ratings need improvement, and certainly the publicity for the ratings needs to be improved.

Also, Congress has conducted hearings into the media industries' aggressive marketing of violence to children. This has led to some

improvements. But, again, Congress needs to keep tabs on this, because it is so very important.

Congressional hearings have also had a positive effect by keeping the issue of media violence in the news and helping educate parents about the risks of media violence. Anything more that can be done to educate parents would certainly provide enormous benefits.

And, finally, Congress can provide funding for more research on this topic, especially research on the neurobiology of brain reactions and on the relationship between media violence exposure and children's mental and physical health.

We must not lose sight of the stakes here. A great deal has changed in the past generation or two. Our children are spending much more time with media than we did, and what they are exposed to is more violent, more graphic, and now, with video and computer games, more interactive than we ever imagined. Our children's heavy immersion in today's media culture is a large-scale societal experiment with potentially horrifying results. And, unfortunately, with hardly a child left behind to serve in the control condition.

The time is now to put serious resources into understanding what we are doing to our children and into finding ways to ensure their welfare and that of society as a whole. I have talked about these ideas in more detail, and I have put a lot of information on my Web site, which is *www.joannecantor.com*, which anybody can access, because I think it is so important to get this message out. The media are not going to help us very much in getting these messages out, so the Internet can have a very positive effect in informing parents and other people.

I will be happy to answer any of your questions, but I would like to thank you again for your sincere and continuing interest in this matter.

[The prepared statement of Dr. Cantor follows:]

PREPARED STATEMENT OF JOANNE CANTOR, PH.D., PROFESSOR EMERITA, UNIVERSITY OF WISCONSIN-MADISON

Mr. Chairman and Members of the Subcommittee, thank you for inviting me to present my views on the media's impact on children. Since 1974, I have been a professor at the University of Wisconsin, focusing the greater part of my research on the impact of media violence on children's aggressive behaviors and emotional health. My book, *"Mommy I'm Scared": How TV and Movies Frighten Children and What We Can Do to Protect Them*, helps parents protect their children from the effects of media violence. Finally, and not the least important in terms of expertise, I am the mother of a fourteen-year-old son.

We now know a lot about the effects of media violence. Study after study has found that children often behave more violently after watching media violence. The violence they engage in ranges from trivial aggressive play to injurious behavior with serious medical consequences. Children also show higher levels of hostility after viewing violence, and the effects of this hostility range from being in a nasty mood to an increased tendency to interpret a neutral comment or action as an attack. In addition, children can be desensitized by media violence, becoming less distressed by real violence and less likely to sympathize with victims. Finally, media violence makes children fearful, and these effects range from a general sense that the world is dangerous, to full-blown anxieties, nightmares, sleep disturbances, and other trauma symptoms.

The evidence about these effects of media violence has accumulated over the last few decades. Meta-analyses, which statistically combine all the findings in a particular area, demonstrate that there is a consensus on the negative effects of media violence. They also show that the effects are strong—stronger than the well-known

relationship between children's exposure to lead and low I.Q. scores, for example. These effects cannot be ignored as inconclusive or inconsequential.

Even more alarming, recent research confirms that these effects are long lasting. A study from the University of Michigan shows that TV viewing between the ages of 6 and 10 predicts antisocial behavior as a young adult. In this study, both males and females who were heavy TV-violence viewers as children were significantly more likely to engage in serious physical aggression and criminal behavior later in life; in addition, the heavy violence viewers were twice as likely as the others to engage in spousal abuse when they became adults. This analysis controlled for other potential contributors to antisocial behavior, including socioeconomic status and parenting practices.

The long-term effects of media on fears and anxieties are also striking. Research shows that intensely violent images often induce anxieties that linger, interfering with both sleeping and waking activities for years. Many young adults report that frightening media images that they saw as children have remained on their minds in spite of their repeated attempts to get rid of them. They also report feeling intense anxieties in nonthreatening situations as a result of having been scared by a movie or television program—even though they now know that there is nothing to fear. [For example, you might find it logical that many people who have seen the movie *Jaws* worry about encountering a shark whenever they swim in the ocean. But you would be surprised to learn how many of these people are still uncomfortable swimming in lakes or pools because of the enduring emotional memory of the terror they experienced viewing this movie as a child.]

These long-term reactions of increased aggressiveness and lingering fear raise important questions about the processes involved in media effects. The fact that a child might imitate a wrestling move he has just seen on TV is not that surprising. Nor is it difficult to explain why a youngster might have a nightmare after watching *Psycho* or *Poltergeist* or *Scream*. But the fact that the negative effects of media violence are so enduring indicates that we need to explore these processes more deeply. We need to know what's happening to children's brains as they watch media violence and what kinds of lasting changes occur.

Some encouraging findings are beginning to emerge from research teams headed by Vincent Matthews at Indiana University Medical School and by John Murray at Kansas State University. By mapping the areas of the brain that are influenced by violent images, these studies promise to help us understand how media violence promotes aggression and to help explain why they have such enduring effects on emotional memory.

What can government do about the problem of media violence?

Congress has already provided help by mandating the V-chip and TV ratings so that parents can have some idea of what's in a program before their child watches it. This is an enormous first step, but currently each mass medium—TV, movies, music, and video games—has its own distinct rating system. Parents need better information, and they would certainly benefit from having one easily understood rating system that would apply to all media.

Congress has already conducted hearings regarding the media industries' aggressive marketing of violent programming to children. These hearings have resulted in many promises on the part of industry executives and some movement in the direction of curbing these excesses. But Congress should continue to keep tabs on these activities.

Congressional hearings have also had a positive effect by keeping the issue of media violence in the news and helping to educate parents about the potential risks of media to their children. Anything else the government can do to help educate parents on this matter would provide enormous benefits.

What Congress can do in addition is provide funding for more research on this topic—especially research on the neurobiology of brain reactions and on the relationship between media violence exposure and children's mental and physical health.

We must not lose sight of the stakes here. A great deal has changed in the past generation or two. Our children are spending much more time with media than we did, and what they are exposed to is much more violent, more graphic, and now, with video games and computers, more interactive than we ever imagined. Our children's heavy immersion in today's media culture is a large-scale societal experiment with potentially horrifying results (and with hardly a child left behind to serve in the control condition). The time is now to put serious resources into understanding what we are doing to our children and into finding ways to ensure their welfare and that of society as a whole.

You can find these ideas and arguments in more detail on my web site *www.joannecantor.com*. Of course, I will be happy to answer your questions. Thank you again for your sincere and continuing interest in this matter.

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Senator BROWNBACK. Thank you.

The Congress has had an interest in this issue for a long period of time, and we have had hearings that go back to a colleague from Illinois, Senator Simon, who held hearings on this for a number of years. In fact, I saw him at Paul Wellstone's funeral and we talked about this topic. It has been an area of focus for some period of time, much like the tobacco health issue. It was a subject of focus for years, and people would get up in the morning coughing, and they knew something was not quite right, but we did not have the "smoking gun." But that is what we are, hopefully, moving towards here on this issue.

Let me ask, anybody on the panel that would want to refer to this: there has been a great deal of frustration about not just the level of violent and sexual material over the years—and we have heard this repeatedly—but also the escalation of the violent and sexual material in movies or other entertainment venues, and now there is even the crossing of violence and sexual materials so that you have violent sexual content that is very pernicious. With this new brain-mapping type of work, can you speculate as to why the entertainment industry is so dependent upon violent and sexual material? Is it because they have to hit certain arousal spots in the brain to keep you watching, and you have to get a heavier and heavier dose to keep you interested?

Dr. KUNKEL. I think the question may be better directed to the second panel, where we have the people who are actually doing that work. But I would venture one comment, and that is, a close colleague of mine, Dr. Edward Donnerstein, is one of the leading researchers who has looked at exactly the nexus you are referencing here, the combination of sex and violence. It turns out that that type of portrayal has the most powerful risk of effects, because each of them brings some potential for arousal. And we have known this before we have had brain-mapping technology through——

Senator BROWNBACK. In different areas of the brain.

Dr. KUNKEL.—other measures. Yes. And so once you have an arousal state, it creates, in humans, a greater readiness to respond, and you will then have a greater readiness to respond to whatever input you are receiving at that time. And so it will be very interesting, as I suggested, it could be quite fruitful to look at sexual material as well as violent material through this brain-mapping technology. Of course, one would not do it with young children, but it would be very interesting to look at content that includes both aspects, both elements of content to see what are the variations in the way the brain responds.

Michael, did you want to comment further?

Dr. RICH. Yes, I had two comments, one being based on the research and one clinical. There is a small body of research that has looked at this nexus between sexual and violent material, and other pleasurable material combined with that violent material, and it finds that this violent material is the most potent because it is associating pleasure with violence. So that if you are making people laugh or you are sexually arousing them at the same time as violence is portrayed, those two feelings get meshed together and get cemented into the long-term memory as a mixed feeling of pleasure with causing pain.

Secondly, on a clinical level, I see with the increasing amount of sexual violence portrayed, increasing amount of sexual violence in the children that I take care of, the adolescents. I am hearing more about dating violence. I am hearing more about date rape. I am hearing more about coercive sexual activity, the threat of violence or the threat of some sort of physical harm related to violence. So this is purely empirical evidence, not as a result of research. But as a clinician, this concerns me, because I think that when we portray that it is normal or that it is okay for someone to demand sex "or else," we are teaching them that. And just as they learn to use the spoon, they will learn to do this in their lives as well.

Senator BROWNBACK. Dr. Cantor?

Dr. CANTOR. And to your question about why the industry is going so often into these two directions——

Senator BROWNBACK. Yes.

Dr. CANTOR.—there is quite a bit of evidence of desensitization, so that if you have one murder in "Terminator I", you have to have ten in "Terminator II" to get the same level of emotional reaction. And I am sure that brain mapping will reaffirm this. So we are desensitizing kids so that, to get the same sort of "buzz" or thrill, they have to go up another notch. And so that is one reason why they are going in that direction, I believe.

Also, I study long-term memories that adults have of exposure to something really disturbing when they were a child. I recently published a study on memories of stumbling into something sexual on television. And there are a subset of kids who stumbled into sexual violence on television as a child who keep that memory and are very troubled by both what might be considered normal sexual activities and violent activities because those memories of sexual violence are so indelible in these kids' minds. So it is very important to make sure parents understand the consequences of unlimited exposure to television by their kids.

Senator BROWNBACK. How old are those memories that you are dealing with?

Dr. CANTOR. Well, they could be from age 5, from age 10. And these are young adults talking about these vivid memories of something that they saw that long ago.

Senator BROWNBACK. So it got burned into the brain.

Dr. CANTOR. It got burned in there indelibly, and they can write about it in great detail. And if they talk about it out loud, you can hear in their voice that the emotion is returning. So these are not things that go away.

Senator BROWNBACK. Do we know what has gone on in the brain to burn that into the brain that hard?

Dr. CANTOR. Well, I think maybe you should ask the next panel——

Senator BROWNBACK. All right.

Dr. CANTOR.—but I think that is one of the things that they are going for in this research.

Senator BROWNBACK. Dr. Kunkel, do we know for certain—because you do a lot of studies of what is being put out in the entertainment industry—do we know for certain that the level, the type of violence, the type of sexual material has ratcheted up in quantity and quality over the past, say, 20 years?

Dr. KUNKEL. I want to address your question at more than just a straightforward level, because for so long people have asked the question, "Is there more violence on television than there used to be?" And that is not the right question to ask. And I think you are headed in the direction of the questions that we need to get to. If you are going to ask is there more violence on television, you have got to count things, and you have got to say, well, this is an act, and so what is an average number of acts per hour or per program. And so you could make comparisons over time, but that equates all acts of violence as being the same. And the whole key to the base of evidence that we have from the content studies is that that is not the case. We are linking the content research to experimental lab studies that show variation in how children respond to these portrayals. And what we find, that I think is the key answer to your question here, is that we know there are certain contextual features that enhance the risk of harmful effects. We analyze the violence on television for the presence or absence of those. And what we find is that all of the contextual features that are most common in the portrayals of violence on mainstream television are those that heighten the risk.

Now, this is interesting, because it suggests that there are several ways in which the media, if it were going to be more socially responsible to address this concern, could proceed. One, and the obvious one that people have known for a long time, is you could simply reduce the amount of violence on television. But I have been to discussions with the industry, and they often say, "Violence is an integral part of life. We cannot take it away from all drama. It would be silly and Pollyannaish to do so, so just accept that there must be some violence." And I say, "Okay, I can accept that, but cannot I ask you to present it in a way that would diminish its risk of harm? Can I not ask you to show it with the punishments and the negative consequences and the pain and suffering?" Because it is the sanitization and the glamorization of violence that increases that risk. In an Arnold Schwarzenegger movie, when someone is thrown out of the fourth story of a building in a fall that would obviously kill any human, you have actors get up, shrug it off, and walk back in to continue the battle. The viewer, especially the young-child viewer, takes the lesson from that that when you engage in some serious violence like that, it does not have the repercussions that it really does in the real world. And you often hear this in real-world scenarios where kids have engaged in violence and something happens. They say, "Gee, I didn't know it was going to be like that in real life."

So the answer is a complex one. It is more than the amount of violence; it is the way in which violence is presented. And that, of course, poses some challenges for the ratings system.

Senator BROWNBACK. Well, then take your question the way you have framed it. Are we seeing more violence portrayed in a way to stimulate arousal now than we were 20 years ago? Maybe that is still not quite framed right. I know there is a difference between what context the violence is placed in.

Dr. KUNKEL. Uh-huh.

Senator BROWNBACK. In the hearings that I have had over the years I have been here, people have talked about the contextual vi-

olence, for example the violence you see in a war movie such as *Saving Private Ryan* or *Schindler's List*, is far different from the gratuitous violence that is pleasurable that you see in another place. In behavioral studies, they are saying this latter form has a very pernicious impact, and the former does not. Now, we would not know yet in the brain-mapping studies, because we are not that far along.

But in these more difficult areas of violence, the pleasurable violence, are we seeing more of that in the entertainment industries over the last 20 years?

Dr. KUNKEL. We do not have data as old as 20 years, because at that point in time we were not clear on all of these variables. But we do know, from looking in recent years, going back to the mid-1990s, that the portrayals of violence commonly include these high-risk factors. One of the most troubling areas of findings is that programming intended for children, children's cartoon programming, it is not realistic and graphic, but it, nonetheless, has many high-risk features, because the violence is perpetrated by attractive characters, has a number of other features that actually make it very worrisome. Again, the industry will say, "Oh, well, that's not realistic violence, and so we're not worried about that. That doesn't trouble us." From the perspective of a young child, all television is realistic. They think the commercials occur to give the actors a rest. And so cartoon violence is a serious concern for young children. It is very, very compelling evidence from the content studies that the context surrounding the violent portrayals enhances its risk of harmful effects just about as much as you possibly could if you were trying to.

Senator BROWNBACK. Dr. Cantor?

Dr. CANTOR. If I could just amplify on that, what Professor Kunkel is talking about, in terms of harms. He is talking about the harms of increasing violent behavior. But different contextual features increase the possibility of fears and anxieties. And, certainly, we know that movies and television programs have become more graphic and provide more scary images than they did 20 or 30 years ago, and those harms are different.

So, when we say that certain contextual features are the most harmful in terms of making kids more aggressive, there are a different set of features that are likely to cause them to have nightmares. And it is clear that movies, particularly, over the years have become much more graphic and much more horrifying. And in general, kids' anxiety levels have increased dramatically over the past 40 years.

Senator BROWNBACK. You all have been supportive, I believe, in your statements for more research, particularly in the field of brain-mapping so that we can find out what is going on in the head. We have a lot of behavioral studies. We could of course still use some more support there. But I would like to see more about what is going on in the mind while watching various types of movies. I think Dr. Kunkel, you mentioned that you would like to see interplay of movies with different contextual subjects.

What would we learn if every movie that came out had some form of brain-mapping study before it was released so that we knew, here is the activity that is going on, here is what is being

stimulated, at least in a small section? With virtually all movies, the industry does—I think in all of them—marketing studies well in advance, as well as screening the movie targeted to age groups to see the response. What would we learn from that sort of broad-based type of information?

Dr. RICH. I think it would be extraordinarily hard to do. I mean, these studies, as you will hear, are very difficult to do in terms of the amount of technology and technicians necessary, in terms of simply making a child sit still for that long, if anybody has ever tried to make a child sit still, for any reason, let alone one where a movement of a millimeter is going to basically obscure your results.

So I think it is an unrealistic hope to do it with every single movie. What I do think could be done is some kind of monitoring, sort of quality assurance, you know, with individual movies, sort of like they do not inspect every piece of beef that goes through; they inspect randomly every tenth or seventh or whatever. And I think that that may be possible.

But I think before any of that occurs, we need to know what it is we are seeing. We need to do the basic research of understanding these mechanisms, where does the brain go with this type of material versus that type of material, before we can determine what is dangerous. Is it the amygdala? Is that where the action is? Or are there other factors that mediate that in various ways?

So I think that one of the things that we can do is extrapolating from these brain-mapping studies features of these media that tend to push kids' brains into directions that are harmful for them and then use that material to help create a more scientifically rigorous and objective ratings system, whereby we can recognize those features in movies and television and video games and rate them accordingly.

Senator BROWNBACK. Maybe you will not want to comment on this, but will we be able to find in some of the brain-mapping work, do you think, long-lasting markers in the brain from entertainment violence? Dr. Cantor has talked about, years later, people bring up vivid images of things they have seen years earlier. Are we going to be able to find that, or is this just way too early to tell in this research field?

Dr. CANTOR. Well, I do not know how far technology is going to progress. I mean, certainly it has progressed very far. And I would yield to my colleagues on the next panel for a more definitive answer. But it seems very clear that changes occur in the brain as a function of traumatic reactions, and those changes are considered indelible by some experts in brain reactions to trauma. So I think it is going to be there in the brain, and hopefully technology will be able to find it and understand. And then I think one of the values of this research is, of course, to understand what is happening, but also to point out that here is a concrete place where we can find this difference to make it clear to parents and even kids as they grow older that these are consequences that are going to stay with them if they are not careful about their media exposure.

Senator BROWNBACK. You have commented, Dr. Cantor, about how we are conducting a vast experiment in raising children with the exposure that we are allowing. Is this experiment comparable

to feeding our children fatty food constantly and then seeing how they turn out, or what is it—you talk in very dangerous terms when you say "a vast experiment" here.

Dr. CANTOR. I believe it is very dangerous, and I believe that parents need to be at least as concerned about what their children consume in the media as what they consume while eating. Both can have very long-term and devastating consequences. And it is a vast experiment, because we were not designed—I think that Dr. Rich made a very good point about the fact that we were not designed to have our fight-or-flight reactions going wild every day for 3 or 4 hours while we are watching television. We were designed to have that mechanism tripped when it was necessary to save our own lives. Now we do not have to do that very often, fortunately, in our society. But what we have—we have developed a technology that brings these horrible and threatening images into our homes and trips that mechanism over and over again.

What the brain mapping is already showing is that our perceptual apparatus seems to give messages to the brain when we see somebody slit someone's throat in these horrible movies. These messages are very similar to what the brain would get if that was actually happening in front of us. And the consequences are very dire, apparently. But it is only because technology has made it possible to see somebody do this over and over again. Whereas, in the real world, fortunately, that would probably never happen. Or if it happened to us once, that would be it.

So we have just created, by technology, an entertainment system that is based on horror and horrible things. And the interesting thing is that we call it "entertainment." And we call it entertainment, I think, because it does arouse us and give us some kind of a charge. But the fact that our society has labeled this "entertainment" and has put so much of its entertainment resources toward these things, as opposed to spending more time developing other interesting, fun themes, is unfortunate.

I think we could find other—if we put more resources into other things, we might be able to entertain people without these negative consequences.

Senator BROWNBACK. Yes. I was just sitting here as you were mentioning that, thinking of the original horror movies, such as perhaps "Frankenstein", and how those movies would probably be laughable today given the standards of the technology now. You would probably laugh at the original Frankenstein set of movies instead of being horrified.

Dr. CANTOR. Well, little kids will still get——

Senator BROWNBACK. Yes.

Dr. CANTOR. But as they grow up and become desensitized—I mean, the film industry is very proud of how it can create these horrific images, and they get awards for it. But these images, are incredibly disturbing to the human system. And just calling this entertainment and having repetitive exposure can have long-term effects. And I think, way back, the Greeks had tragedies. And everybody says, "Oh, well, they had it back then." But I imagine that you got to go to one tragedy a year, because this was live and it was very difficult to put together. But we can have 24 hours a day, seven days a week, Greek tragedies coming at us. And the effects

on our immune system, our health, our psychological health, are enormous.

And I think brain mapping is really going to help get at what is going on inside in ways that we can get at only peripherally by asking people to report with their words.

Dr. RICH. To extend what Dr. Cantor was saying, not only is this a vast experiment; it is a vast uncontrolled experiment. An experiment, you know, sort of assumes that someone sat down and said, "Let's test this. Let's see what this compared to this looks like." And we are in areas now where those of us who do research on a regular basis are saying, "Will I be able to get this past the ethics board of the institution at which I'm doing it," because I am asking whether humans can deal with material that the ethics board may say, "No, you can't show kids that."

If you think about it, we are doing this experiment with movies that the industry itself says are not good for kids and yet markets to kids. We are doing that with video games. We are doing it every single day, as you say, 24 hours a day. But I think to call it an experiment, unfortunately, elevates it to a level of thought and control that it does not have. It is out of control.

Senator BROWNBACK. Dr. Rich and others, is it fair to say that there is clearly a public health impact to consuming the violent entertainment that we are doing today in this vast experiment?

Dr. RICH. Absolutely.

Senator BROWNBACK. Dr. Kunkel?

Dr. KUNKEL. Absolutely.

Dr. CANTOR. Absolutely.

Senator BROWNBACK. And none of you have any qualms about saying that there is a public health impact from consuming the levels of violent entertainment that we have today.

Dr. RICH. I see it every day in children who come in to see me.

Dr. KUNKEL. It is a risk factor, in the same way that cigarette smoking is a risk factor. Not every one who smokes cigarettes dies of lung cancer, but it is a statistically significant risk factor. The more you smoke, the longer you smoke, the more likely the negative outcome. This same relationship exists with TV violence. It is just that TV violence is not the only factor that contributes to real-world violence——

Dr. CANTOR. Right.

Dr. KUNKEL.—and aggression.

Dr. CANTOR. I would say it is a risk factor for becoming violent, but also there are effects on everyone, such as increased levels of hostility, feeling anxious, those kinds of things that do not always—there is a small percent that become violent, but there is a much more pervasive effect on most kids that has to do with emotional desensitization, fears, and those sorts of things.

Senator BROWNBACK. So all of you—I want to be very clear on this—all of you believe that the levels of violent entertainment being consumed by our children today cause significant public health impact.

Dr. CANTOR. Yes.

Dr. KUNKEL. Yes.

Dr. RICH. And it is one in which we can intervene, even more importantly.

Dr. KUNKEL. Yes, we stand with all of the agencies that have been mentioned here today, the U.S. Surgeon General, the National Institute of Mental Health, the National Academies of Science, all of whom or all of which have reviewed this evidence and come to the same conclusion.

Senator BROWNBACK. Thank you all very much. It has been a very instructive, very strong panel, and I appreciate very much your attendance.

The next panel includes Dr. Daniel Anderson. He is a professor in the Department of Psychology, University of Massachusetts at Amherst, and Dr. John Murray, professor at Kansas State University in Manhattan, Kansas.

Dr. Anderson, thank you very much for joining us. This panel will be talking about the specifics of the brain-mapping work and what we have found to date. I appreciate very much your attendance, and the floor is yours.

STATEMENT OF DR. DANIEL R. ANDERSON, PROFESSOR, DEPARTMENT OF PSYCHOLOGY, UNIVERSITY OF MASSACHUSETTS

Dr. ANDERSON. Thank you, Mr. Chairman.

I have studied the children's use of television and the impact of television on children for 30 years. Unlike the previous panelists, my focus has actually been more on the positive as well as the negative impact of media. My work is focused on the impact of television on cognitive development and academic achievement. I have done, also, a bit of work on violence.

American children spend more time with electronic media than they spend in any other activity except sleep. While some research has shown negative effects, especially from television violence, other research has shown the positive impact of television programs that are designed to benefit children.

For example, colleagues and I interviewed teenagers we had intensively studied as preschoolers in Springfield, Massachusetts, and Topeka, Kansas, your home State, during the early 1980s. We found that the more these teens had watched educational programs such as "Sesame Street" when they were preschoolers, the better grades they received in high school in English, math, and science. They also reported reading more books for pleasure than did teens that had not been regular viewers of educational television. I should also point out that the more these kids had watched educational television as preschoolers, the less likely they were to endorse violent and aggressive solutions to common problems that are encountered on a daily basis. The point is that electronic media can be designed to have a beneficial impact on children, an impact that is traceable more than a decade later.

The design of educational TV programs has greatly benefitted from behavioral research concerning children's attention to and comprehension of television. Such research has been incorporated into the design of popular and effective preschool TV programs. And here I will name the ones that I have worked on—"Sesame Street," "Blue's Clues," "Dora the Explorer," "Bear in the Big Blue House," among others.

Now, the advance of medical technology has made possible an extraordinary opportunity to further increase our understanding of how children and adults attend to and comprehend electronic media. This advance allows the three-dimensional imaging of brain activity. This can be used to track brain activity as viewers watch and respond to film, television, or computer displays.

I have had the fortune to design one of the first studies of brain activation as adults viewed visual action sequences in films. My colleagues in this research were from the University of Massachusetts and from the Memorial Sloan-Kettering Cancer Center in New York, where the research took place.

We wanted to know what parts of the brain are activated when adults comprehend visual film action sequences. Action sequences unfold over many successive film shots, and the viewer, in order to understand the action sequence, must make many inferences concerning space, time, implied but not explicitly shown actions, and character intentions, among others.

Although comprehension of film action sequences seems effortless to adults, we had no idea what parts of the brain accomplished this. We showed action sequences to adult viewers and recorded their brain activation using functional magnetic resonance imaging. We compared this activation to brain activation during sequences of unrelated film shots. These sequences were just jumbles of images. We were interested in identifying those areas of the brain that are uniquely activated by the coherent, understandable sequences. We argue that these brain areas are those that are most important for visual comprehension of film.

We found 11 such brain areas, all in the cerebral cortex, and most in the right hemisphere. When we considered what is known about the function of these brain areas, a sensible story emerges. For the first time, we really begin to understand how the brain puts together the pictures and makes sense of what we see. These areas are involved in face and object recognition, the perception of action, movement, space, the sequencing of events, and the emotional interpretation of experience.

We consider this study just the beginning of what neuro-imaging can tell us about media comprehension and, eventually, media impact. Based on my experience with behavioral research, the information gained from neuro-imaging will eventually inform us about ways to maximize the beneficial impact of media and about ways to minimize the harmful impact. I strongly support any initiative to provide dedicated funding to this emerging and most promising area of science.

[The prepared statement of Dr. Anderson follows:]

PREPARED STATEMENT OF DANIEL R. ANDERSON PROFESSOR, DEPARTMENT OF PSYCHOLOGY, UNIVERSITY OF MASSACHUSETTS

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had not been regular viewers of educational television.[1] The point is that electronic media can be designed to have a beneficial impact on children, an impact that is traceable more than a decade later.

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Senator BROWNBACK. That is a good way to put it at the end, too, that we can learn what works for good and what works for ill in the media, because television can be very beneficial. You have listed several of the favorite programs of my two younger children. They also have several others that were not listed earlier, but those programs have more of a violent touch to them than the ones you listed. They like those, as well.

Dr. Murray, good to see you, old friend.

Dr. MURRAY. Well, thank you very much.

Senator BROWNBACK. Welcome to the Committee.

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[1] Anderson, D.R., Huston, A.C., Schmitt, K.L., Linebarger, D.L. & Wright, J.C. (2001). Early childhood television viewing and adolescent behavior. *Monographs of the Society for Research in Child Development*, 68(1), Serial No. 264, 1–143.

[2] Anderson, D.R. (in press). Watching children watch television and the creation of *Blue's Clues*. In H. Hendershot (Ed.), *Nickelodeon nation: The history, politics, and economics of America's only TV channel for kids*. New York: New York University Press.

[3] Anderson, D.R., Fite, K.V., Petrovich, N. & Hirsch, J. (2003). Cortical Activation During Comprehension of Visual Action Sequences: An fMRI Study. Unpublished manuscript, University of Massachusetts at Amherst.

STATEMENT OF JOHN P. MURRAY, PH.D., PROFESSOR, KANSAS STATE UNIVERSITY

Dr. MURRAY. Thank you, Chairman, for inviting me. And thank you for your continued support of this issue, because you have been talking about it for a long time.

And, as we know, and as we have heard from other testimony, this is an issue that has confronted Congress and the Senate, in particular—I dare say this very Committee, Senate Commerce Committee, in 1969, and I think it was in this room. I actually attended that hearing, when the Surgeon General was asked what he thought about TV violence and would he be willing to undertake a major study of TV violence and children, which he did. And I had the good fortune to serve on that Committee back in 1969.

Senator BROWNBACK. Think of the context of the—I do not mean to interrupt you—but violence in 1969, what type of television shows we were talking about at that time?

Dr. MURRAY. Oh, let us see. I will take a guess. My memory fades a bit, but they would have been "Kojak," "Starsky and Hutch;" before that, "Dragnet."

Senator BROWNBACK. "Dragnet" is violent.

Dr. ANDERSON. If I could comment on that, the Saturday morning cartoon shows were exceptionally violent in ways that they are not now, and they tended to show explicit violence with gore. That all dropped out after——

Dr. MURRAY. But you are quite correct; it was a very different kind of violence than the kinds of violence we have seen now. And you have raised that issue with the previous panel, and there is the general feeling of the kinds of violence—both the kinds of violence and the quantity of violence and the graphic nature has greatly increased from the 1960s to the 1970s to the 1980s to the 1990s and now into the new century.

So this has been a longstanding issue. It is one that we have tried to grapple with in many ways. I have spent 30 or so years doing that in various ways.

But what I would like to talk about today is where we have come and where we would like to go with the kinds of technology that we have available to look at the issue of brain mapping.

I do not know whether I could use some of these pictures.

Senator BROWNBACK. The charts? Maybe we can get some assistance. Jana, would you mind helping out with that? Get some charts over here.

Dr. MURRAY. A few charts, but I will not use many charts. But while we are putting this up, the issue, as others have pointed out, was discussed by the Surgeon General's report in 1972, by the National Institute of Mental Health report in 1982; the American Psychological Association produced a report in 1992—I do not know what the meaning of these 10-year cycles are, but we have missed it for 2002. I was fortunate to be on the American Psychological Association panel with some other psychologists—a task force appointed by the American Psychological Association, the "Task Force on Television on Society," appointed in 1986. We spent 5 years interviewing consumer groups who were concerned about violence, interviewing the Screen Actors Guild, the Directors Guild, performers, producers of programming in Hollywood, interviewing

other researchers and gathering evidence. And we produced a report 5 years later, in 1992, entitled "Big World, Small Screen, The Role of Television in American Society," which is the official report of the American Psychological Association study, and I will leave that for the Committee.*

Also, my colleagues and I, Dr. Ellen Wartella, at the University of Texas, and Dr. Norma Pecora at Ohio University, have been working on a new book to review the 50 years of research on television and children. And I have with me—alas, not the full book—Dr. Anderson will be one of the contributors to the book, as well, the chapters—but I do have the bibliography that we have assembled for that report; 1,945 research reports and papers published since the 1950s through 2003. About 600 of those deal with television violence issues. The rest deal with other aspects of television and children. So, it is not for want of some knowledge about these concerns that we are here today. There is a great deal of evidence that suggests that violence is worrisome.

But, as others have testified, it is rather like the smoking and health issue. I think you are quite correct in drawing that parallel, because it is the issue of convincing not just mothers and fathers and the general public that this is a serious concern, but convincing the television industry that stands to either lose or gain quite alot if they change their format. And they see no reason to change some of the programming, because they feel that it works for them. It gets audiences, it gets ratings, it gets viewers.

I think the work that we are beginning to talk about embarking on, on brain mapping and looking at the ways in which children process violence, is a way to break that stalemate.

If I could have that—yes, that next chart.

I always put up this chart (slide No. 1) that—I think Senator Brownback has seen this before, and he particularly likes it because it shows the way bills work through Congress. It is complicated.

[Laughter.]

Dr. MURRAY. My point in using this chart is to explain how—to talk about the fact that we need to understand how observing violence on television leads to aggressive reactions in children or adults who watch the programming.

Much of the research over the past 50 years has been on this right-hand side of the graph showing that there is a complex interrelationship of viewing and leading to aggressive behavior. What we have always assumed is the activity on the left-hand side, that watching violence leads to encoding or memorizing the violence or recalling the violence, rehearsing it in some way in your own mind, and then storing that away in a manner in which it might affect your subsequent behavior. We have always hypothesized that, but we have not been able to look at that until very recently, with the advent of functional magnetic resonance imaging (fMRI).

And that is what we have been doing with our study at Kansas State University and at the University of Texas Health Science Center in San Antonio, where we were able to invite children to come to the Research Imaging center, where we had equipment,

*The information referred to has been retained in Committee files.

magnetic resonance imaging units, available to study their brains while they watched violent and nonviolent material.

If you have ever had an MRI, you know that it can be sometimes a little off-putting and it is a little noisy and what have you, but the children were less intimidated by this. They were quite interested in the technology and the science of it.

They would view the video clips that we showed them while they were reclining in a magnetic resonance imaging unit. We showed the videotapes to them by projecting video images into a plastic mirror that projected the video down the bore of the MRI and bounced the image off a plastic mirror right above their head. So, while the mirror was only about the size of the palm of your hand, it, in fact, filled their whole visual field. And they listened to the audio track through headphones that were like the old airline headphones. They are air-powered headphones rather than electrical-powered headphones, because that would not work in a strong magnetic field.

So this is an example (slide No. 2) of one of the children who participated in this study. The kinds of material that we showed them consisted of one of three kinds. Well, they saw all three kinds of video stimuli. The violence that we used, we took as video clips from a movie, a popular movie at the time, *Rocky IV*, Sylvester Stallone's most recent movie at that time. It features, like many of the Rocky movies, a fight at the beginning, and a fight at the end, and a lot of "stuff" that goes on in between.

We were interested in this particular kind of violence for two reasons. One, you may note—this is the jacket cover from the DVD (slide No. 3) you may note that it was PG violence. We were going to be screening this to 8- to 12-year-old boys and girls, so we wanted to use material that they would normally see. Using things like "Reservoir Dogs" or there is far more ghastly violence out there, but using that would be inappropriate with these youngsters. And we wanted to see just how they processed this sort of "PG" violence.

So we used two clips, two three-minute clips from *Rocky IV*—a fight at the beginning that lasts about three minutes, in which Rocky's friend Apollo takes on a superhuman Russian fighter, Drago, I believe his name was, over here, and Drago beats him bloody and senseless and kills him in the ring. It ends with Apollo falling to the ground, blood pouring out. And the final clip, as I recall, is Drago saying, "If he dies, he dies." And that is sort of—you end there. The ending fight was Rocky then taking on the superhuman Russian fighter and, of course, winning in the end after a bloody battle of 3 minutes.

Now, what was interesting about this is that this is the kind of violence that most kids will see in films, will see in television. As a matter of fact, this played on television, because we pulled that from an earlier study. So, it played on commercial television, and any child would be likely to see that. The other issue was that we wanted it to be interpersonal violence, one-on-one sustained interpersonal violence, and that is the other reason for choosing this video clip.

Now, they actually saw two three-minute clips of these boxing scenes. They also saw two other kinds of programming, nonviolent

programming, which consisted of a three-minute clip of National Geographic special of baby animals at play—we wanted a lot of action, but no violence—and a three-minute clip of Children's Television Workshop program, "Ghostwriter," which is a children's program for that age group, 8- to 10-year-olds, dealing with literacy issues and reading skills, but it is set in a mystery context. So there was human action, a lot of movement, some mystery, but no violence. They also saw, as a part of the control, another set of two three-minute clips of just a white X on a blue screen. And the reason for that is that when your eyes are open, a whole bunch of activations will occur in the brain just watching anything. And so we wanted to be able to pull out anything that was related to the nonviolence.

The next, and I believe my final, slide (slide No. 4) is the results of this study. We scanned eight children—five boys, three girls—who participated in the study, so it is a beginning study, and it is, as Dr. Anderson pointed out, very difficult to do these studies, so this is just the beginning. We scanned their brains continuously in the MRI while they watched these six three-minute clips of violence, nonviolence, and control. So, there were 18 minutes of continuous scanning in the MRI, which is a huge amount of information on the children's brains. We also scanned for about 5 minutes before and 5 minutes after in order to get a structural image of their brains, because everyone's brain differs. That is a nice thing to know. We are all a bit different in size and structure. But the basic pieces there are all in the same place.

And what this particular slide is, is the composite of all eight children. There happened to be eight slides here, or eight pictures here, but each one is a composite of all eight children while they were viewing violence with all the other video stimuli subtracted out. So we compiled all of their brains for the 6 minutes that they viewed the violence and subtracted out all of the activations that were related to viewing 6 minutes of the X or viewing 6 minutes of the nonviolence. So this is the residual activations of these eight children. And these slides are different slices through the brain—we did not have to do that, thankfully—the technology allows us to re-compose these images without slicing open the brain. Starting at the top left, it is the slice very much up at the top of the brain, and then successive slices all the way down. You begin to see where the eyeballs are as you come down lower into the brain here. And then down at the very base of the brain down here, the last slide.

What is significant about these? We went into this assuming that we would see—because we were showing them violence—that we would see emotional arousal, that we would see activation of an area of the brain that senses threat or danger, and others have made reference to this earlier, and it is an organ in the brain called the amygdala. And there are actually two of them, one of the right and one on the left, at the base of the brain. Amygdala, I believe, is Latin for almond. It is sort of an almond shape about the size of your thumbnail. And that is the organ that prepares the body for fight or flight. It senses danger in the environment. If someone were to drop a snake in front of the recorder, I think you would gasp for a moment. And that gasp, that—gasp—is the amygdala

preparing the body for danger and preparing the body for fight or flight. It stops respiration, it pulls blood back from the periphery into the central core so that you do not bleed to death if you are attacked, and so on, and so forth.

We expected to see activation of the amygdala, because what they were watching was an inherently threatening encounter. And we expected to see predominantly right-sided activation—activations on the right hemisphere of the brain, because that is an area in which you see a lot of emotional processing. Well, we got that. What you see here are these predominantly right-sided activations. Here, you have to go down way into the base of the brain, but you see strong activation of the amygdala. Right here, on the right side. That is even more interesting, because that is where the negative emotional arousal was sitting, as opposed to the left side of the amygdala. So you get activation there on the right side.

The other things that we found, though, the two things that we found that were surprising are, up here in the very first picture you see a little activation in an area on the right side of the brain, on the cortex, up at the top, called the premotor cortex. It is an area of the brain that controls not movement, but "thinking" about movement. So if I were to plan to pick up that glass, if I went to reach for the glass, before I ever moved my hand the premotor cortex would kind of play out what I have to do to position the hand and move it in and grab this without spilling it all over the microphone. And then the motor cortex would kick in, and that would actually control the physical movement.

What we saw was premotor cortex, and we looked at that for a moment and said, "Gosh, I wonder what's going on there?" Well, the answer to that, after my colleagues and I pondered that for awhile, the answer to that is that what was happening is that these youngsters could not move in the MRI. They were completely immobilized in the MRI, because any movement would cause problems with the brain scans. But they were watching—remember, they were watching close interpersonal violence, constant beatings and boxing and fighting. And what was going on there, the best interpretation, is that they were thinking about making the movements. They could not make the movements, so you did not see motor cortex activated, but you saw premotor cortex. They could not make the movements, but they were thinking about "imitating" these movements.

Any parent who has watched a young child or several young children sit and watch, say, some sort of kickboxing cartoon or a Power Rangers cartoon or Power Rangers on television, you will notice that they start kind of—about halfway through, start pushing and shoving and start kickboxing with their brothers and sisters. That is exactly what we are talking about here, you were getting spontaneous attempts to imitate the violence that they were seeing, the boxing in this case.

The other area of the brain that was really surprising was in the back of the brain, up here at the top, an area called the posterior cingulate. It is an area of the brain that we were really surprised to see activated in this context. My colleagues were doing work at the Audie Murphy Veterans Administration Hospital, which is part of the San Antonio Medical Center complex, working with military

veterans who are suffering from severe post-traumatic stress disorder. They were also doing some work with women who had been victims of rape and were suffering post-traumatic stress disorder. And when they would put them in the MRI and ask them to recall the memories, the things that were causing them so much distress, these memories that flood back and cause night sweats and terrors, as they began to recall those, it was the posterior cingulate that was activated.

The general interpretation is that that area in the back of the brain is where human beings store traumatic memories, or significant life-threatening memories or really important memories that have to be stored for long-term memory, or they get stored away for long-term memory, and are easily recalled. Long-term memory, in the normal sense of remembering the multiplication tables, if you can cast your mind back to that, is usually stored on the left side, in the left hemisphere, in the parietal area. But, the posterior cingulate is a very peculiar area of the brain that is specialized to storing dangerous, significant memories.

And here these kids were storing and activating an area of the brain that seems to be reserved for long-term memories of trauma, while they were watching what they knew to be entertainment violence.

My point on all this is that they could tell you, every one of those children could say, "Oh, I know Rocky programs. I've seen some Rocky films." They knew it was make-believe. They knew it was staged. But the brain did not know that it was staged. The brains of these children, as, I think, the brains of everyone else, treat this entertainment violence as something significant, something real, and something that you should pay attention to and store it away for long-term memory.

That, I think, is the scariest part of the whole study. I, again, emphasize that this is an initial study. It is very early in our investigations. But what we have got is a story that can be quite frightening, that kids are growing up watching a lot of violence, and their brains, at least, and they themselves, are treating it and storing away in a manner that allows them to recall it instantly and use it as a guide for behavior. So by the time—there have been studies that show that—based on content analysis, that by the time a youngster graduates from high school, he will have seen 100,000 assaults and, you know, 30,000 murders. There are various figures floating around. But all of those are stored away, or at least a big chunk of them are stored away as possible guides for future behavior. So someone pushes in front of them in line, someone disses them, they do not have to think for a long time about how to respond. They have seen how Sly Stallone will respond, and they will lash out and lash back.

So our concern is about the long-term memories and the long-term effects. We have already seen studies that show long-term effects of viewing violence. And we hope to pursue this kind of research with the help of Congress in future brain-mapping studies. And I will leave some extra copies of our initial report on that study here for them.

[The prepared statement of Dr. Murray follows:]

PREPARED STATEMENT OF JOHN P. MURRAY, PH.D., PROFESSOR, KANSAS STATE UNIVERSITY

Neurobiological Research and the Impact of Entertainment Violence on Children

Concern about the impact of television violence began with the start of television broadcasting in the United States. Although the first commercial television station was licensed by the Federal Communications Commission in 1941, regular broadcasting did not begin until after World War II and became established later in 1947 or 1948. Nevertheless, the first official expression of concern about TV violence occurred in the U.S. Congress in Hearings in the Senate and House in 1952 and 1954. So, the issue of TV violence is not new to Congress. What is new, however, is the breadth and depth of research that has been accumulating on the impact of TV violence and, more recently, emerging studies of children's brain activations while watching TV violence.

In recent years, I have had the good fortune to study children's brain responses to TV violence through the support of Kansas State University, the University of Texas Health Science Center at San Antonio, the Mind Science Foundation at San Antonio, and the College of Communication at the University of Texas at Austin. In addition, I have enjoyed the intellectual support of my colleagues at The Menninger Foundation of Topeka, Kansas and Houston, Texas and the Harvard School of Public Health and the Boston Children's Hospital Center for Media and Children's Health. A summary of our initial research on the impact of video violence and children's brain activations was published in the October, 2001 issue of the monthly mental health journal, *Psychiatric Times* (available online at: *www.psychiatrictimes.com/p011070.html* and attached as an Appendix to this testimony).

Research on brainmapping and TV violence is the outgrowth of a large and robust scientific literature on the impact of video violence—research that began in the 1950s and continues to date. I and my colleagues, Norma Pecora (Ohio University) and Ellen Wartella (University of Texas, Austin), are preparing a book that will review the history of research on television and children and will provide a comprehensive bibliography of the research and publications in this field. (The book is: *Children and Television: 50 Years of Research*, edited by Norma Pecora, John P. Murray, and Ellen Wartella, to be published by Erlbaum Publishers in late 2003.) I have provided the Committee staff with a draft of the comprehensive bibliography of 1,945 reports on children and television—approximately 600 of these reports deal with the issue of TV violence. However, the issue being discussed in this Hearing—*neurological correlates of video violence*—is only foreshadowed as a future possibility in this new book because there is very little in the way of completed studies. *

What we have learned from the vast body of research on children and television—and especially the research on TV violence—is the suggestion that viewing violence *does* influence the attitudes, values and behavior of children and adults who view this material. The main types of effects are three in number:

1. Aggression: Viewing video violence leads to increases in aggressive behavior and changes in attitudes and values favoring the use of aggression to solve conflicts;

2. Desensitization: Viewing video violence may lead to a decrease in concern about the pain and suffering of others; lower levels of concern about violence in society; and an increased willingness to tolerate violence; and

3. Fear: Viewing video violence may lead to increased concern about one's personal safety; heightened fear that one may be the victim of violence; and decreased trust in the motives of others—a phenomenon known as the "mean world syndrome."

The effects described above have been identified in various studies over the past 50 years and they represent a very worrisome set of outcomes of violence viewing. However, much less is known about how these effects play out in individuals—how do children or adults come to understand and process the violence that they see in entertainment media?

Our initial study of brainmapping and TV violence in children begins to provide some insights into the ways in which children process video violence. Much more research is needed before we can fully understand the effects of video violence, but enhanced brainmapping research can lead to significant progress in dealing with media violence.

* The information referred to has been retained in Committee files.

In our study, conducted at the Research Imaging Center (RIC) of the University of Texas Health Science Center at San Antonio (UTHSCSA), we used functional Magnetic Resonance Imaging (fMRI) to map the brains of eight children (5 boys, 3 girls), ages 8 to 13 years while they watched violent and nonviolent videotapes. The youngsters who participated in this study were normal, healthy boys and girls who were good students and had no history of problems at school or home.

The children viewed six, 3-minute, video clips—two clips each of violence (*Rocky IV*), nonviolence (*National Geographic* and *Ghostwriter*), and a control for viewing activations (a white "X" on a blue video screen). During these 18 minutes of viewing, we continuously scanned their brains while they viewed in the MRI. We also scanned for several minutes before and after the viewing to establish structural/anatomical features of their brains.

In designing the study, we anticipated that we would see emotional arousal to the video violence and that this would be manifested in significant right hemisphere activations. In particular, we anticipated seeing involvement of an area of the brain that senses "danger" in the environment—the amygdala—and prepares the body for 'fight or flight' and we expected prefrontal cortex activation.

The results of the scans confirmed our initial expectations and provided some additional surprising insights. In particular, two additional areas of the brain that were activated told us a very interesting story about what was happening in the minds of these young viewers. In the first instance, an area of the prefrontal cortex—the premotor cortex—was activated while viewing violence (not the other video clips) and this suggested that the youngsters were 'thinking about moving' (they could not move in the MRI and had they moved we would see motor cortex activation). Rather, what was happening while the youngsters watched the boxing, was a possible attempt at imitation of the boxing movements—thinking about but not able to actually imitate the movements. This is similar to what parents have observed when they see young children watching kick-boxing actions; the young viewers are likely to start imitating the movements on their brothers and sisters.

The second surprising finding was an activation in the back of the brain—the posterior cingulate—an area that seems to be devoted to long-term memory storage for significant or traumatic events. My colleagues in this research had been working with military personnel who were being seen at the adjoining Audie Murphy Veterans Administration Health Center for severe post-traumatic stress disorder (PTSD). When they scanned the brains of PTSD patients and asked them to recall the events and images that were causing them distress, the posterior cingulate was the area activated. Now, in our study, these children were not suffering from PTSD but they were watching traumatic and dramatic violence (although the movie was rated "PG").

In summary, the results or our initial, and very limited study, of children's brain activations while viewing entertainment video violence, suggest that the violence is arousing, engaging, and is treated by the brain as a real event that is threatening and worthy of being stored for long-term memory in an area of the brain that makes 'recall' of the events almost instantaneous. This is as 'scary' as it gets; even more than an "R" rated slasher film. Here, we see normal children storing away violent images in a manner that could be used to 'guide' future behavior. Naturally, this is only the beginning of the story and we need to conduct much more extensive research on neuroimaging and violence.

Thank you for your consideration of this testimony.

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TV Violence and Brainmapping in Children

by John P. Murray, Ph.D.

Research conducted over the past 30 years leads to the conclusion that televised violence does influence viewers' attitudes, values and behavior (Hearold, 1986; Murray, 2000, 1994, 1973; Paik and Comstock, 1994; Surgeon General's Scientific Advisory Committee on Television and Social Behavior, 1972). Although the social effect of viewing televised violence is a controversial topic of research and discussion, the body of research is extensive and fairly coherent in demonstrating systematic patterns of influence. In general, there seem to be three main classes of effects:

- *Aggression*. Viewing televised violence can lead to increases in aggressive behavior and/or changes in attitudes and values favoring the use of aggression to solve conflicts (Huston et al., 1992).

- *Desensitization*. Extensive violence viewing may lead to decreased sensitivity to violence and a greater willingness to tolerate increasing levels of violence in society (Drabman and Thomas, 1974; Thomas et al., 1977).
- *Fear*. Extensive exposure to television violence may produce the "mean world syndrome," in which viewers overestimate their risk of victimization (Gerbner, 1970; Gerbner et al., 1994).

Although we know that viewing televised violence can lead to increases in aggressive behavior or fearfulness and to changed attitudes and values about the role of violence in society, we need to know more about how these changes occur in viewers—the neurological processes that lead to changes in social behavior.

Within the context of social learning theory, we know that changes in behavior and thoughts can result from observing models in the world around us, such as parents, peers or the mass media. The processes involved in modeling or imitating overt behavior were addressed in social learning theories from the 1960s (Bandura, 1969, 1965, 1962; Berkowitz, 1965, 1962), but we must expand our research approaches if we are to understand the neurological processes that might govern the translation of the observed models into thoughts and actions.

Both Bandura (1994) and Berkowitz (1984) have provided some theoretical foundations for the translation of communication events into thoughts and actions. Bandura's social-cognitive approach and Berkowitz's cognitive-neoassociation analysis posit a role for emotional arousal as an "affective tag" that may facilitate lasting influences. With regard to aggression, we know that viewing televised violence can be emotionally arousing (e.g., Cline et al., 1973; Osborn and Endsley, 1971; Zillmann, 1982, 1971), but we lack direct measures of cortical arousal or neuroanatomical patterns in relation to viewing violence.

The pursuit of neurological patterns in viewing violence would likely start with the amygdala, because it has a well-established role in controlling physiological responses to emotionally arousing or threatening stimuli (Damasio, 1999, 1994; LeDoux, 1996; Ornstein, 1997). Indeed, a National Research Council report (Reiss and Roth, 1993) concluded:

> All human behavior, including aggression and violence, is the outcome of complex processes in the brain. Violent behaviors may result from relatively permanent conditions or from temporary states . . . Biological research on aggressive and violent behavior has given particular attention to . . . functioning of steroid hormones such as testosterone and glucocorticoids, especially their action on steroid receptors in the brain; . . . neurophysiological (i.e., brain wave) abnormalities, particularly in the temporal lobe of the brain; brain dysfunctions that interfere with language processing or cognition.

Thus, one suggestion for further research on the impact of viewing media violence is to assess some of its neurological correlates. In particular, the use of videotaped violent scenes can serve as the ideal stimulus for assessing activation patterns in response to violence.

It is very likely that the amygdala is involved in processing violence, but the projections to the cortex are not clear. However, developing hypotheses about viewing violence and brain activation needs to start with research on physiological arousal (e.g., Osborn and Endsley, 1971; Zillmann, 1982; Zillmann and Bryant, 1994) and then link this to cortical arousal. In this regard, the work of Paul Ekman, Ph.D., and Richard Davidson, Ph.D., using electroencephalogram recordings while subjects viewed gruesome films indicated asymmetries in activation patterns in the anterior regions of the left and right hemispheres (Davidson et al., 1990; Ekman and Davidson, 1993; Ekman et al., 1990). In particular, positive affect (indexed by facial expression) was associated with left-sided anterior activation, while negative affect was associated with right-sided activation (Davidson et al., 1990).

Our preliminary research (Liotti et al., in press; Murray et al., 2001) has focused on the amygdala and related structures in an effort to identify the neurological correlates of viewing televised violence. In this instance, we used functional magnetic resonance imaging (fMRI) to map the brains of eight children (five boys, three girls; aged 8 to 13 years) while they watched violent and nonviolent videotapes. The violent video segments consisted of two, three-minute clips of boxing from "Rocky IV." The nonviolent video segments were two, three-minute clips of a National Geographic program on animals at play and "Ghostwriter," a children's literacy program set in a mystery context. In addition, we presented two, three-minute control, rest/fixation clips of an "X" on a blue screen.

We conducted whole-brain (18 to 22 slices) echoplanar fMRI throughout the 18 minutes of viewing. Following the viewing, structural or anatomical (aMRI) images were acquired. Both the fMRI and aMRI images were normalized to Talairach

space, and statistical analyses were conducted with task-induced blood oxygenation-level dependent (BOLD) changes detected using a conventional statistical parametric mapping method of voxel-wise independent paired t-tests.

In this study, we found that both violent and nonviolent viewing activated regions implicated in aspects of visual and auditory processing. In contrast, however, viewing violence selectively recruited right precuneus, right posterior cingulate, right amygdala, bilateral hippocampus and parahippocampus, bilateral pulvinar, right inferior parietal and prefrontal, and right premotor cortex. Thus, viewing televised violence appears to activate brain areas involved in arousal/attention, detection of threat, episodic memory encoding and retrieval, and motor programming. These findings are displayed in the Figure, which provides the significant contrasts between the violence-viewing and nonviolence-viewing sessions. The regions of interest in the composite activations of the eight children included the amygdala, hippocampus and posterior cingulate. These areas of the brain are likely indicators of threat-perception and possible long-term memory storage of the threat-event (particularly, these patterns are similar to the memory storage of traumatic events in posttraumatic stress disorder) (Brannan et al., 1997; Liotti et al., 2000). These activation patterns are important because they demonstrate that viewing video violence selectively activates right hemisphere and some bilateral areas that collectively suggest significant emotional processing of video violence.

Of course, this is a preliminary study with a small sample of children, and we must conduct further studies with larger samples of young viewers. However, this preliminary research leads us to conclude that there are important, theoretically predictable patterns of neurological response to viewing media violence. In our next series of studies, we will explore these neuroanatomical correlates of viewing violence in children who have had differing experiences with violence in their lives in order to better understand the processes of sensitization and desensitization.

In this instance, we will assess the responses of children who have experienced violence as victims of abuse, in contrast to youngsters who are more aggressive. We also expect to see differences in response to viewing violence among the abused, high-aggression and low-aggression children. We expect to see increased responsiveness to threat in the abused children and decreased responsiveness to threat in the high-aggression children.

Furthermore we anticipate differences in media preferences and viewing patterns to correlate with the level of aggression in these children. This constellation of findings will begin to address the patterns of response to aggression and the learning of aggression from media models. The issues of desensitization and enhanced aggression may be related to the patterns of brain activation observed in these children. The social significance of brain mapping and violence viewing is the contribution these studies make to our understanding of the learning and cognitive/affective processing of aggression in children and youth.

Dr. Murray is professor of developmental psychology in the School of Family Studies and Human Services at Kansas State University and director of the Media and Mind Program at the Mind Science Foundation in San Antonio. He is also a trustee of The Menninger Foundation.

Senator BROWNBACK. Thank you very much, Dr. Murray. Are there other researchers that are doing similar brain-mapping work?

Dr. MURRAY. Well, Dr. Anderson has been doing some work with adults on understanding visual materials, television material, not necessarily with violence, but the same principles apply. And a group at the University of Indiana Medical School has been looking at behavior-disordered children and their response to clips from video violence games.

My colleague, Dr. Rich, and I are hoping to do similar extended studies at Harvard Medical School, and particularly we have had discussions with the chief of neuro-radiology at Boston Children's Hospital, which is ideally set to work with young children and do the kinds of brain mapping that would allow us to have much greater insights into this.

Senator BROWNBACK. Is anybody doing brain-mapping work on the impact of sexual material? We heard from the prior panel that there is speculation that you are triggering different parts of the

brain with violence versus sexual material, and that the mixing of the two of them may get a double buzz going.

Dr. MURRAY. This is my speculation, that you combine this kind of violence with the kind of sexual material that you find in the genre known as "teenage slasher films"—"Friday the 13th" or a whole bunch—Jason and Elm Street or what-have-you—where you suddenly have a combination of not only violence, but also sexual arousal and eroticism in the violence combined with the violence, you have created probably the most potent, dangerous, flammable substance that you could possible put together. No one has done that, and there are reasons—well, this is all very new, so people have not had a chance to kind of——

Senator BROWNBACK. Explain your statement, "You have created the most potent, flammable"——

Dr. MURRAY. Because you have got arousal from several different sources, and you have linked the fear associated with violence with the pleasure associated with sexual arousal, and you have got both fear and pleasure syndromes running together—I mean, this is all speculation. We would need to look at this. And I think what you have got is an indelible memory. And that is why Dr. Kunkel's colleague, Edward Donnerstein, who has looked at the effects of sexualized violence on college students, university students, finds that—not in an MRI—but finds that males who have watched these sexualized violent erotica are much more likely, in some other settings, to hold denigrating views of women, are much more likely to be less responsive to women who have claimed that they have been raped. It is a very complicated set of studies, but the main message is that sexualized violence is high-potency, high-octane violence that has some lingering effects on the ways in which males and females will interact.

Senator BROWNBACK. I presume both of you would support that we need to get a lot more information from a lot more data-points in this brain-mapping field, but both of you would view it as quite promising for us to learn what this experiment in entertainment with sex and violence is doing to us as a society?

Dr. MURRAY. I think it is crucial. I am sorry, I jumped ahead. But I do think it is extremely important to understand how children, and adults, for that matter, process the violence that they see, the sexuality that they see, and how those get combined. And the only way we are going to do that is by having a number of researchers in different areas doing similar kinds of studies with equipment and bringing together their findings. We are just at the beginning of this sort of research.

Senator BROWNBACK. Dr. Anderson?

Dr. ANDERSON. You have heard just about all the research that has been done so far, in terms of brain mapping and media. I was not aware of Dr. Matthew's work at Indiana University. But there is a lot of work that is going on in brain mapping on a whole variety of issues, including mental illness and studies of basic cognitive processes, memory, and so on. All of this work is an interdisciplinary work that requires teams of people from a variety of backgrounds. You have to have a neuro-anatomist who can assign areas of activation to the brain. You have to have a physicist who can calibrate the MRI machine. You have to have computer scientists

who generate the graphics. And you have to have a mathematician to do the analyses. It is quite an operation. It is very expensive. And up to this point in time, there has simply been no focus on media as being an issue, simply because the people who do media research frequently do not have a background in brain studies, the people who do brain studies have no background or necessarily interest in media, and so on. But when the funding is available and the time is right, and I would say the time is right now, then, in fact, I think that this methodology can just provide just an explosion of knowledge in—certainly in the areas that we have been discussing, but many other areas related to media, as well.

Senator BROWNBACK. What will it provide? You say an "explosion of knowledge," Dr. Anderson. What will this information provide if we put forward a funding stream or require some form of review of this nature before the release of a product? What sort of information would we find out?

Dr. ANDERSON. Well, I will give you an example from my research. One of the things that we found was that in order to put together the way an adult puts together an understanding of an edited sequence of shots, requires large areas in the prefrontal lobe of the brain on the right side of the brain. These are actually analogous to the language areas that are on the left side of the brain. But these appear to be visual language areas. They are areas that essentially are comprehending the syntax, the flow of meaning, of visual images. Well, one of the things that we know is that this area of the brain is very immature in young children. It is the slowest developing area of the brain. There are a few others that I notice from Dr. Murray's charts that are also very slow developing areas of the brain. Well, that information, and especially if we can verify it in studies of children, that information can tell us of some of the limitations that children would have in processing and understanding media and being able to put them in some kind of context.

Prior to this, prior to these studies, we did not have a clue, other than the most basic areas—obviously, when you are listening to television, the auditory areas area active; you are watching the television, the visual areas are active; that is a given—but other than that, we did not have any idea what parts of the brain were being used to process and deal with television. So this is very early days, but I think we have learned so much just from these two preliminary studies, that it is just, I think, huge. We will be able to put together a very detailed story about how the brain—we use our brains to process media. When we know that, then we can start to put together a detailed story about what the impact of media will be on the brain, and I think that can be both for good and bad, obviously.

I guess I represent the light side, and you represent the dark side.

Senator BROWNBACK. So as we put that information together, are we going to be able to know, then, the impact of the cultural environment, or at least the impact of the consumption of certain types of cultural materials on our children? Are we going to be able to come to any conclusions about what sort of impact this violent en-

tertainment has on a percentage, a fairly significant percentage, of children. If it has a long-term impact that is negative?

Dr. MURRAY. We can certainly begin to see where——

Senator BROWNBACK. Or positive, on the side of Dr. Anderson?

Dr. ANDERSON. I guess my answer would not quite deal with the cultural question. But here is an aspect that is interesting. There is quite a bit of research to indicate that children are performing better on IQ tests compared to children from previous generations. So that when you look at the norms from the 1930s, for example, and you test today's children with the same tests that were given back then, today's children do far better on those tests. But they do not do better on all items. And, in fact, what they do better on is a set of items that have to do with the ability to conceive of things in three-dimensional space.

So what could possibly be accounting for that? One of our colleagues in this research, Patricia Greenfield, has shown that children with interactive media, who are working on games like Tetris, and so on, that involved spatial concepts, show improvements in this ability. Since this increase has been going on for a long time, for generations now, other people have speculated that movies and television have contributed to this.

Well, in our work, we find that in order to put together this coherent sequence of actions, an area of the brain that we know is involved in spacial intelligence is very much activated. And, in fact, when you think about it, as you follow action through space on television, you have to form a model of the environment that characters are moving through, and you have to do it very quickly, and, of course, you are getting—as you watch lots of movies and television, you are getting practice doing this hour after hour, day after day, week after week. This may have had a long-term impact, in this case for the better, on our ability to conceive things in three-dimensional space. But we would not have even known it, we would not have the mechanism, without the kind of research that we are doing showing that when you are watching these films you are actually stimulating and activating that part of the brain.

Senator BROWNBACK. Has the entertainment industry contacted either of you about this brain-mapping work, saying, "Well, this is very interesting about what the product that we are putting out is doing. We want to work with you in a positive way and make sure we are feeding children good food and not bad food"? Or broccoli and less cotton candy?

Dr. MURRAY. Well, I have worked—I was appointed to an advisory board for CBS, the Children's Television Advisory Board, in 1996–97, when we were just starting this research. And it was to help them select some programming that would be educational and entertaining, to respond to the Federal Communications regulations on EI programming. And we had a very lively discussion over about a year period. We would meet every six months. For maybe two years, actually. And then it all fell apart, and the committee was disbanded. And the committee consisted of Dorothy Singer, from Yale, and myself, and Aletha Houston, from University of Texas, and a few others.

So the possibility is there. The system fell apart because they decided that they really did not like our advice on some of the programs.

Senator BROWNBACK. But have they contacted you about brain-mapping work?

Dr. MURRAY. Not about the brain mapping, but—because we talked about it at the time. I was just in the early stages of doing this brain mapping, and they were—I guess my judgment about the response was cautious concern. They were not exactly pleased with the research underway, because it had the potential for being a worrisome addition, another list of the worries. But they were interested in the fact that you could actually do this and that maybe it could help, as Dr. Anderson suggests, in other ways of providing educational programming that is far more beneficial or targeted in a better way to enhancing children's development.

Dr. ANDERSON. I have actually worked quite a lot with networks and production houses to make educational television for young children. The research that we have drawn on so far has been behavioral research, research on issues of comprehension. What can a 3-year-old understand? What can a 4-year-old understand? What can a 5-year-old understand? Issues of attention, what is attention-worthy for a young child, what causes them to lose their attention. And curriculum, what are the things that a child needs to know? What needs can we serve for that. I have got to say, at least at the preschool level, the cable television networks, primarily Nickelodeon and Disney, have really taken the position that it is important to minimize the violence in their offerings, and, especially for preschoolers, have taken the position that the programs should be designed to be beneficial, they should have a curriculum. Some, of course, are better than others.

But as soon as the brain-mapping research reaches a critical mass of knowledge where we can be very sure that we know things that are going on, I am quite certain that they will be very interested in taking the positive aspects of it and applying it.

Senator BROWNBACK. Gentlemen, this is very enlightening. I wish we had more people here. Because we have held hearings on this in the past based almost exclusively on behavioral studies and anecdotal information. All important, but that does not cover hard, physical science. We have not had access to that in the past, and I am excited to see that sort of body of knowledge developing. It will be great to be able to build off of that, and to take that to the country and to the industry once we further develop the information and get it in a shape where we are confident and comfortable with what we have. The early information you present here seems to me to track very closely with all the behavioral studies that we have, and explains a lot of the behavioral studies, of which you have documented 1,945. So it seems to me that we have been at the point of, "Well, I was coughing every morning from smoking, but I don't know why," and now we are getting to the point of, "well, here is why." This is a very important step for us to cross and very important for us to understand as a country. For this is a vast experiment we are doing of raising our children on media, much of which can very good and is very good and uplifting, but some of which can be very detrimental, and behavioral studies are

saying is very detrimental. Now we can see the hard data of how that actually works.

I applaud your work. We are going to be working here in Congress to attempt to get more funding so that we can develop this very important area of studies further, and shifting funding from other places to try to be able to develop this work much more aggressively. We hope you and your colleagues will engage this effort, so that we really can understand this in a hard science setting.

Thank you for joining us. The hearing is adjourned.

[Whereupon, at 4:25 p.m., the hearing was adjourned.]

A P P E N D I X

PREPARED STATEMENT OF HON. ERNEST F. HOLLINGS,
U.S. SENATOR FROM SOUTH CAROLINA

I want to thank Senator Brownback for calling this hearing. Media violence is an important issue that this Committee has studied on numerous occasions. And while I am interested to hear the testimony today on brain mapping research, I believe that this Committee has heard ample evidence about the affect of violent programming on children to spur Congress to take action.

For decades, renowned professors, scientists and public health professionals have conducted extensive research to study the effect of media violence on children. The evidence has consistently demonstrated that exposure to media violence is related to aggressive and violent behavior. Watching violent television shows or movies and playing violent video games contribute to making a child more aggressive, more desensitized to violence, and more prone to using violence to resolve problems.

The amount and magnitude of violence in video programming and video games continues to increase. Parents should be empowered with tools that enable them to limit the amount of violence their children see. As legislators, we have an obligation to help parents in this endeavor. We need to take action to curb violent programming consistent with our values and the Constitution.

In each of the past five Congresses, I have introduced legislation designed to create a "safe harbor" time period during which parents can be assured that children will not be exposed to violence. The support for my legislation has been widespread and it has been reported out of this Committee multiple times—most recently by a vote of 17 to 1. Once again, I have introduced the "Children's Protection from Violent Programming Act" in this Congress.

Today, we will be hearing additional testimony supporting the prevailing wisdom that violence begets violence. I am ready to take action and hope that the Committee will once again act favorably on my legislation.