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Using Natural Experiments to Study the Impact of Media on the Family

The randomized trial is the gold standard in scientific research and is used by several fields to study the effects of media. Although useful for studying the immediate response to media exposure, the experimental approach is not well suited to studying long-term effects or behavior outside the laboratory. The ''natural experiment'' approach, a quasi-experimental method commonly used by economists, exploits settings in which there is naturally occurring variation that ''randomly'' influences the amount and type of media that individuals are exposed to. We discuss the methodological issues of natural experiments and the ways in which findings based on this approach can complement the findings from laboratory or other experimental settings. The examples we discuss highlight the value of interdisciplinary work in better understanding media's impact on family issues such as fertility, divorce, domestic violence, and child well-being.

The question of how media affects families is important from both a scientific and practical perspective, as it can help inform the decisions of both practitioners and parents. Family members are increasingly exposed to a variety of media, including television, movies, print and digital advertisements, and the Internet (Pergrams & Zaradic, 2006). Some of these media may have negative effects, whereas other types of media may have positive effects. Social scientists from a variety of disciplines have used different techniques to model and estimate these impacts. In this paper, we discuss what economists have learned about these questions through the use of ''natural experiments.'' We view the economist's approach as complementary to those in other disciplines (and also recognize its occasional use by other disciplines). A primary aim of this article is to encourage a more interdisciplinary approach to evaluating the impact of the media on the family.

The gold standard in scientific research is the randomized controlled trial. In a randomized controlled trial, subjects are randomly assigned to a treatment or control group. By construction, a correctly implemented randomized experiment yields a causal estimate of the effect of treatment on the outcome of interest because it balances all of the potential confounding factors between the two groups. There are, however, limitations to real randomized trials. First, many experiments would be unethical or immoral. Second, many important outcome measures are impractical to measure in a laboratory. Third, laboratory and especially field experiments can be very expensive to administer, especially for research questions that involve large interventions or require large samples. Attrition is also a major problem in long-term experimental studies.

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When laboratory or field experiments are not possible, economists have tried to take advantage of ''natural experiments.'' At the broadest level, a natural experiment is a situation that is thought to approximate a randomized trial even though there was no actual randomization involved (DiNardo, 2008). Economists have searched for settings in which there is naturally occurring variation in treatment, for example, a sudden change in public policy (e.g., law changes), random environmental shocks (e.g., weather), or other unexpected events (such as the birth of twins). The setting must be one where treatment is arguably independent of all the confounding factors that might otherwise bias an estimate.

Natural experiments are a quasi-experimental methodology, and as such the key question for internal validity is whether the identifying variation (the ''treatment'') is actually random. Except in rare cases, there are no direct statistical tests to establish internal validity. This is because it is impossible to test whether treatment is correlated with an unobserved variable. Instead, the researcher must provide arguments and indirect tests in an attempt to convince the reader that the natural experiment can be used to estimate a causal effect. To start, the researcher lays out why the natural experiment occurred and why it is likely to introduce random variation in treatment. The researcher then continues by empirically ruling out alternative explanations with a variety of indirect and placebo tests as falsification exercises. Although the indirect tests will vary from application to application, some of the more common ones include showing (a) the treatment occurs before the outcome, (b) the treatment cannot be predicted by lagged outcomes, (c) there are no differential preexisting trends in the outcome, and (d) the observed covariates are balanced in the treatment and control samples. Often, supporting evidence comes from analysis of auxiliary data.

In this paper, we develop the idea of natural experiments as we discuss the contributions of economists to the literature on media's causal effect on families. We begin by comparing and contrasting natural experiments to those done in the laboratory, which, by design, estimate short-term effects. In this first section, we focus on two examples. We start with the effect of exposure to violent movies in the laboratory versus the field. We outline why the two approaches identify different effects and why these complementary approaches are important

for a better understanding of media's effect on families. We then provide an example of a natural experiment that cannot be well studied in the laboratory, namely, the effect of unexpected, negative emotional cues on domestic violence. In the second half of the paper, we turn to the arguably more important question, namely, the long-term effects of repeated media exposure on families. We explore how economists' use of natural experiments adds to our understanding of the long-term causal effects of media exposure, especially television exposure. The varied natural experiments we discuss show that long-term exposure has both positive and negative effects on families. In this section, we provide several examples of how economists evaluate the validity of a natural experiment. Throughout, we point out the benefits and potential challenges to the use of natural experiments.

NATURAL AND LABORATORY EXPERIMENTS IN THE SHORT RUN

Whereas natural experiments have a long history in economics (Meyer, 1995), the use of natural experiments by economists to study the effects of media is more recent. An early pioneer in the use of natural experiments to study the effect of media is the sociologist David Phillips. He initially called his settings ''found experiments,'' although the idea is the same as a natural experiment. In a series of papers, he documented that suicide rates increase after mass media reporting of suicides, including an increase in teenage suicides (Phillips & Carstensen, 1986). In similar papers, Phillips found that motor vehicle accident fatalities also increase after newspaper stories about suicide (Phillips, 1979). Phillips has also used a similar methodology to study the impact of mass media violence on homicides, using both fictional television stories and news reporting as natural experiments (Phillips, 1983; Phillips & Hensley, 1984). In each case, the idea behind Phillips's natural experiments is that, once seasonal patterns have been controlled for, media reports of suicides, murder, or other violent behavior should be random events. The spikes in homicides and suicides following such events can be argued to be the causal result of media exposure. He argued that these effects operate through imitation or suggestion. By their design, these experiments are well suited to estimate short-run effects but not long-run impacts.

One reason to conduct natural experiments is that they serve as useful complements to laboratory experiments. Over the past several decades, laboratory experiments have greatly added to our understanding of the causal effects of media in the short run. The experimental literature using the laboratory, largely conducted by psychologists, has focused heavily on studying the effect of media violence on aggressive behavior, both for violent video clips and violent video games (see Anderson & Bushman, 2001; Anderson et al. 2003; Bushman & Anderson, 2002). This experimental literature has convincingly demonstrated a causal link between violent media on aggressiveness immediately after exposure, including a sharp increase in aggression for children and young adults. These findings have led many scientists, parents, and politicians to worry about the risk of media violence and its negative impacts.

To focus on how the use of a natural experiment can add to what can be learned from the laboratory, we make a comparison to laboratory experiments that expose subjects (typically children or college students) to short, violent film clips. That literature provides causal evidence on the short-run effect of media violence on aggressiveness but not whether this translates into higher levels of violent crime in the field (through arousal or imitation). Dahl and DellaVigna (2009) addressed the question of whether violent movies increase violent crime using a natural experiment. They exploited the natural experiment induced by variation in when violent movies are released.

The idea behind this natural experiment is that in some years there will be strongly violent movies on certain weekends during the year wheres in other years those same weekends will have nonviolent blockbuster movies. Which year happens to have a violent blockbuster movie should otherwise be uncorrelated with violent crime, after flexibly controlling for seasonality. As an example, in the second week of February 2001, the strongly violent movie *Hannibal* was released, whereas in other years, the second week in February was usually dominated by blockbuster romantic comedies. This provides a natural experiment, where the treatment is the availability of a violent movie compared to the control of the availability of a nonviolent movie on similar weekends.

Dahl and DellaVigna (2009) found that violent crime is actually lower on days when the audience for blockbuster movies is high. Broken down by time of day, in the evening hours when people are in the theaters, there is a significant negative effect on crime for strongly and mildly violent movies; violent crime falls by around 1.2% per million violent movie goers. In contrast, weekends with nonviolent blockbuster movies have small and insignificant effects. The authors interpreted this first effect as ''voluntary incapacitation.'' On evenings with high attendance at violent movies, many potential violent criminals choose to be in a movie theater and are incapacitated from committing a crime during the movie.

In the night-time hours after a violent movie is over, crime falls by an even larger percent, whereas nonviolent movies again have no discernable impact. This delayed effect initially seems at odds with the psychology experiments, which find large increases in aggressiveness due to arousal immediately following exposure. It is, however, important to recognize that the two methodologies capture different effects. The laboratory experiments estimate the impact of exposure to a violent movie compared to a nonviolent movie. The natural experiment allows individuals to choose between a movie and an array of alternative activities. Dahl and DellaVigna's (2009) paper provides evidence that violent movie attendance is displacing more violent-prone alternative activities (such as drinking at a bar).

The natural experiment emphasizes that time use plays an important role in how violent media affects crime in the short run. Violent media keeps violent people busy during the movie and changes an evening's activities even after the movie is over, so that violent movie attendees are less prone to commit violent crime. The psychology experiments emphasize content alone, which explains the difference in findings. To be clear, Dahl and DellaVigna (2009) were not arguing for a catharsis effect from violent movies; they actually found some evidence for an arousal effect, but argued that this effect (which increases violent crime) is more than offset by the much larger time use effect (which lowers violent crime relative to the alternative activity).

It is also important to point out that the laboratory experiments are capturing the reaction to media violence in a representative sample of the population, whereas the natural experiment results are largely driven by which

types of individuals choose to sort into violent movie attendance. As such, the laboratory setting is not representative of the effect of exposure in most field settings, where consumers choose what media to consume. Rather it is representative of an instance of unexpected exposure, such as a violent trailer placed within family television programming.

We believe that the causal estimates from both the laboratory and the natural experiment are interesting and informative for answering different questions. For example, the natural experiment findings are important for evaluating policies that would restrict access to violent movies, because these policies will lead to a substitution toward alternative activities that may well be more violent in the short run. We also believe, however, that differences between the laboratory and field can be narrowed by changes in the design of laboratory experiments. For example, laboratory experiments could incorporate sorting into a violent movie to replicate selection in the field or can change exposure to a full-length movie (Lazear, Malmendier, & Weber, 2012).

Although Dahl and DellaVigna (2009) found no impact of movie violence in the weeks following exposure, their design, like the laboratory experiments, cannot address the more important question about the long-run effect of violent media consumption. In the next section, we turn to natural experiments that can get at the effects of long-term exposure to television (although not necessary violent media). Before doing so, we provide one more example of a natural experiment that addresses short-run effects.

The previous example illustrates how laboratory and natural experiments complement each other by answering different questions. Many times, however, laboratory or field experiments for important family outcomes cannot be done due to ethical or practical considerations. One such example is whether unexpected emotional cues (or ''visceral factors'') play an important role in precipitating family violence. Media can have a powerful potential to affect people's emotions, as has been demonstrated in the laboratory. But linking this evidence to an effect on domestic violence is difficult to do, and laboratory and field experiments attempting to measure actual domestic violence would be both impractical and unethical.

Is family violence linked to unexpected disappointments (negative emotional cues) that are broadcast via the media? To help frame this question, consider the theory of gain-loss utility developed by economists and psychologists, which says that individuals asymmetrically frame gains and losses around a rationally expected reference point (Koszegi & Rabin, 2006). In simple terms, this theory says two things: (a) an individual's happiness depends not on actual outcomes but on outcomes judged relative to expectations, and (b) unexpected disappointments have a larger impact on individuals compared to pleasant surprises.

To test such a theory in the context of domestic violence, one would need an experiment where family violence outcomes could be measured after both unexpected positive and negative surprises. Card and Dahl (2011) use the natural experiment created by NFL football game broadcasts. The setting is motivated by three reasons. First, a large number of fans are strongly attached to local teams, with regular-season Sunday games averaging a television audience equal to 25% of all local households. Second, there are detailed game statistics that make it easy to identify more or less salient games. Perhaps most importantly, the existence of a well-organized betting market allows one to infer the expected outcome of the game, which serves as the reference point for gain-loss utility. Each of these characteristics is crucial to their ability to use this setting as a natural experiment.

Does this natural experiment provide ''random'' positive and negative upset shocks? If betting markets are unbiased predictors of the game outcome, the answer is yes. With unbiased betting markets, after conditioning on the pregame point spread any differential effect of a win versus a loss is the causal effect of the game outcome by construction. So a sufficient condition for the validity of this natural experiment is easy to state and verify. Indeed, empirical evidence suggests one cannot make money by betting against the market (i.e., there is strong evidence the market is unbiased).

Card and Dahl (2011) found that police reports of male-on-female intimate partner violence rise 10% in areas where the local NFL team lost a game they were favored to win by four or more points. Consistent with reference point behavior, a loss when the game was expected to be close or when the local team was expected to lose does not have a significant effect on family violence. Also consistent with the theory, they found little protective effect of

an unexpected win, pointing to an important asymmetry in the reaction to unexpected gains versus unexpected losses.

Timing is an important element of their natural experiment, and Card and Dahl (2011) match the hourly local police reports of violence to the time frame of the football games. The increases in violence after an upset loss are concentrated in a narrow time frame at the end of the game, as one might expect if the spike in violence is due to a transitory emotional shock. These patterns are more pronounced for upset losses in games that are more emotionally charged, such as games against a traditional rival, when the local team was still in playoff contention, or after a particularly frustrating performance (an excessive number of sacks, turnovers, or penalties). Their paper suggests that a better awareness and management of expectations could help to reduce violence within families.

One drawback of many natural experiments is that it can be difficult to identify the mechanisms, even if a causal effect can be documented. For example, in the Card and Dahl (2011) paper, although their analysis points to a causal spike in domestic violence after an unexpected loss, the mechanism is difficult to unravel without further information. For example, the effect could operate through increased alcohol consumption in response to the unexpected loss, but their design and data can only hint at whether this is the mechanism. Another inherent challenge with natural experiments is that they are not always easy to replicate and may not have external validity. For example, other types of unexpected and upsetting events may affect different segments of the population or operate in different ways, and therefore have a dramatically different impact on violent crime.

It is important to discuss the role of control variables in natural experiments versus both laboratory experiments and field experiments. In laboratory and field experiments, the only reason to include control variables is to improve the efficiency of the estimates (i.e., to decrease the standard errors). This is because with a laboratory or field experiment, the treatment is asymptotically uncorrelated with the covariates as a result of randomization. In many natural experiments, however, it is important to include a set of control variables, because often the treatment is only a random event conditional on those controls. In the

natural experiments that rely on timing, it is important to control for seasonality, as in the Dahl and DellaVigna (2009) example. This is also true for natural experiments where there is a conditioning variable that captures all the available information up to a point in time, such as a natural experiment involving stock market prices or betting odds (see Card & Dahl, 2011).

LONG-RUN EFFECTS OF MEDIA

The short-run effects of media are primarily of interest because of the belief that the accumulation of short-run effects is likely to result in long-run changes in behavior. The ability to influence long-run media exposure in an experimental setting, however, is extremely limited. As a result, most of the research on long-run effects of media is based on correlations between media exposure and the outcome of interest (controlling for as many confounding factors as possible). There is often emphasis put on collecting longitudinal data so that the temporal ordering of media exposure and measured behavior can be established.

Even with the best longitudinal data, the primary concern about nonexperimental data remains: Individuals get to choose the amount and type of media exposure. As such, there may be unobserved characteristics about individuals that influence both their media choices and their outcomes (even if these outcomes are measured at a later period). Many of these omitted variables can be included as controls in the analysis, but there is always the possibility that important characteristics are not observed or might even be unmeasureable. If these unobserved characteristics affect both media consumption and the outcome, the resulting estimate of media exposure will be biased. This problem of unobserved heterogeneity affects many important areas of research that involve individual choices, such as church attendance, marriage, and paternal and maternal employment, all of which are likely to influence important family outcomes but for which the selection problem is difficult to deal with.

Although observational data in these settings can provide important descriptive relationships, economists' focus on causal estimates has forced them to look for natural experiments, a quasi-experimental method that tries to approximate the gold standard of a randomized trial. The key to this approach is to look for a situation

in which there are two groups of individuals with similar characteristics but who experience different levels of exposure to media (due to reasons that are unrelated to their own individual attributes and choices).

Except in rare cases, there are generally not any direct statistical tests that can be used to establish validity, because the question is whether treatment is correlated with an unobserved variable. Rather, it is a combination of understanding why the natural experiment occurred, indirect and placebo tests as falsification exercises, and supplementary empirical evidence that together can provide a convincing case. Many of the common and convincing indirect tests involve the timing of the treatment and outcomes. Such arguments and indirect tests aim to convince the reader that the source of variation in media exposure is not being influenced by the decisions and characteristics of the individual (particularly those related to the outcome of interest). Because each application is unique and has its own set of plausible alternatives that must be ruled out, we explore arguments and indirect tests for quasi-random assignment in the context of the several examples that follow.

Recent work by Olken (2009) provided an excellent illustration of the natural experiment approach. Indonesia's mountainous terrain provides a situation in which two very similar and closely located villages can experience very different levels of television signal strength based on which side of the mountain they happen to be on. By combining models of signal strength with detailed geographic information system data on the topography of Indonesia, Olken constructed a measure of the signal strength in each village and separated the variation in the strength of signal across villages into the part that is due to predictable factors (distance to major city, elevation, etc.) and the part due to the ''happenstance of topography.'' He found that the topography-induced differences in exposure to television and radio cause individuals in the more media-exposed villages to become less involved in community organizations.

Although not the focus of his research, the approach Olken (2009) used could be applied to outcomes that are more specifically related to the family, such as fertility, divorce, or child well-being. The ability to extend this type of research hinges crucially on the availability of the relevant data for the outcome of interest in locations and time periods where the natural experiment

occurs. In fact, one of the primary criticisms of the natural experiment approach is that it limits researchers to looking at those settings in which a natural experiment has occurred. For better or worse, this feature of natural experiments has led many researchers to use historical data to look at interesting stages in the diffusion of different forms of media (Gentzkow & Shapiro, 2008; Strömberg, 2004) and then provide thoughtful analysis of whether the results at a certain place and time have external validity and can be applied to other settings.

The ideal natural experiment is often unavailable. As a result, researchers will examine situations in which the variation in media exposure is not as random as the topography of Indonesia, but might still unfold in ways that are unrelated to the characteristics of the individuals being influenced by the media. R. Jensen and Oster (2009) used a 3-year panel of individual-level data from 180 villages in India. During this time period, 21 of these villages received cable television for the first time. Their empirical approach compared outcomes ''between survey rounds across villages based on whether (and when) they added cable television'' (p. 1059). They found that the introduction of television decreased acceptance of domestic violence, increased the amount of autonomy experienced by women, and led to lower rates of fertility.

One of the concerns about this setting is that trends in other variables (such as income or ''modernity'') may cause certain villages to both adopt cable television and also experience changes in the outcomes of interest. R. Jensen and Oster (2009) used many of the traditional methods in this vein of research to provide support for the validity of their natural experiment. First, they showed that there were no preexisting differential trends in these outcomes between the villages that did or did not adopt cable television. Second, they showed that the outcomes of interest are not correlated with future cable access. That is, behavior this year cannot be predicted by using information on whether you adopt cable next year, which would often be the case if the relationship being estimated is driven by underlying but unobserved differences between the treatment and control groups. Third, they collected additional information about how cable operators made the decision about which villages to operate in. They found that this decision is largely driven by issues related to the cost of supplying the cable rather than village-level

demand issues (in particular those that might influence the outcomes).

A piece of supporting evidence in the natural experiment approach is to provide a theoretical explanation for the relationship between the change in media and the outcome of interest. R. Jensen and Oster (2009) discussed some of the ways in which television may have brought about the changes they document (some of which they were able to provide supporting evidence for using additional data they collected). Increased television access may alter fertility choices by providing more information on family planning alternatives. It may also change the value of women's time or increase the relative value of leisure for men, leading men to grant greater liberty for women to do more outside of the home. Also, television exposes rural villages to urban culture, a culture that exhibits fewer cases of acceptable wife beatings, less interest in having their next child be male, and greater autonomy for women.

There have also been studies outside of economics that use the natural experiment approach to study this issue. Centerwall (1989) used differences across countries in the timing of television adoption to look at the effect it had on homicide rates. Joy, Kimball, and Zabrack (1986) examined a town in Canada that did not receive television until 1973 and compared the change in physical aggression among children between this town and two control towns. Both of these studies found that the introduction of television led to an increase in violence. Subsequent criticisms of Centerwall's research highlight some of the issues that we discuss in this paper, such as the importance of examining preexisting trends (G. Jensen, 2001) and controlling for confounding factors (Felson, 1996).

In both studies, the small number of relevant geographic units (three countries or three towns) makes precise inference a challenge. In contrast, the more recent research in economics used multiple geographic units within a single country. This makes it possible to control for country-level changes over time and provides enough distinct geographic units to provide meaningful statistical inference after properly clustering the standard errors (Bertrand, Duflo, & Mullainathan, 2004).

A pair of recent papers using data from Brazil provides more specific evidence that the effect of television can operate through the content of the shows (Chong & La Ferrera, 2009; La Ferrara, Chong, & Duryea, 2008). Rather than looking at the diffusion of a media technology, they examined the diffusion of a particular type of show on television, the soap opera. In Brazil, the television network Rede Globo had a virtual monopoly on the production of soap operas, a set of shows that depict a lifestyle that involves smaller family sizes and higher levels of divorce and infidelity. These papers exploited differences in the timing of when the Globo network entered different areas of Brazil and found that the arrival of this network led to increased rates of divorce (Chong & La Ferrera, 2009) and lower levels of fertility (La Ferrara et al., 2008).

The primary concern about this natural experiment is whether the Globo network decided to locate in those areas that were already starting to experience the demographic changes that are depicted in the soap operas. The authors used many of the common approaches in this literature to establish the validity of the natural experiment. First, they examined changes in fertility during the years before and after the entry of Globo and found no decrease in fertility prior to entry but a sharp decline immediately after the arrival of Globo. Second, they showed that which areas received the Globo network are not the areas that were already experiencing larger changes in fertility or divorce. Third, they documented that the presence of Globo in neighboring areas did not influence local fertility (which would be the case if the results were driven by unobserved cultural or economic factors that might be common to adjoining areas).

La Ferrara et al. (2008) also used within-show variation to provide further evidence that the effects are operating through the content being depicted on these shows. They found that children born in areas receiving Globo are much more likely to be named after the main characters of the soap operas aired that year. Also, the fertility effects are strongest for the women who are closest in age to those of the main female characters in that particular year. These two examples illustrate the type of additional evidence that can be used to support the main findings of a natural experiment and help provide insight into the specific mechanism through which the effect is operating.

Other examples of recent research, although less focused on outcomes related to the family,

highlight the type of natural experiments that can be used to examine the more general effects of media on society. Each paper follows the same general approach: (a) documenting the differences across similar individuals in the amount or type of media they were exposed to (the strength of the natural experiment), (b) providing evidence that the difference in exposure was not determined by other factors that could induce a spurious relationship (the validity of the natural experiment), and (c) documenting the changes in the outcome of interest that accompanied the change in media exposure.

DellaVigna and Kaplan (2007) exploited variation in the content that households receive on television, focusing on the effects of the introduction of *Fox News* (a conservative cable news channel) that had reached about 20% of towns in the United States by November 2000. They first showed that the availability of this channel in different towns appears to be largely idiosyncratic after conditioning on a set of basic controls. They found, however, that the towns that received *Fox News* between 1996 and 2000 experienced a 0.4 to 0.7 percentage point increase in the fraction of votes going to the Republican candidates. They noted that this change in behavior might represent a ''temporary learning effect for rational voters, or a permanent effect for non-rational voters subject to persuasion'' (p. 1187).

Gentzkow and Shapiro (2008) used information on the timing of the arrival of broadcast television in different counties in the United States to examine the pressing concern voiced by parents about whether ''television rots the brain.'' They used a large nationally representative data set on test scores during the 1940s and 1950s (when television diffusion occurred in the United States) and found that each additional year of childhood exposure to television actually *increased* test scores during adolescence by 0.02% of a standard deviation.

They also considered whether different groups of children were affected differently by exposure to television. This part of their analysis highlighted the fact that, for many children, the effects of exposure to media are determined largely by the type of activities that are being displaced by television. For children in the types of homes with the highest levels of parental involvement, the effect of television was negative (although this effect was not

statistically significant). For these households, the additional media time was likely replacing other activities that would have provided better cognitive development. They found, however, much larger positive effects for children from households where English is not the primary language, for children whose mothers have less than a high school education, and for non-White children. These homes provide much less language-rich environments (Dickinson & Snow, 1987), so that the alternative use of time would have provided less cognitive development than television. In addition, television may have pulled children away from harmful influences outside of the home or diffused situations in the home that lead to abuse. This last point illustrates the importance of considering both the exposure effect and the time-use effect of media (a point also highlighted by the Dahl & DellaVigna, 2009, paper discussed in the previous section).

DISCUSSION

The purpose of this article is to describe the economist's approach to examining the effect of media on outcomes that are important to the family. The primary approach of economists has been the use of natural experiments that provide quasi-random variation in the amount, type, or content of the media that individuals have access to. Examples of these natural experiments include changes in the content of movies released in a particular week, differences across areas in the strength of television signals they can receive, and differences in the timing of when different technologies or specific content providers arrive in different parts of a country. Each of these create settings where otherwise similar individuals experience different types of access to media, and these differences can be used to estimate the effect of media on families.

Table 1 provides a summary of each of the natural experiments that we describe in this paper. The information in the publication year column highlights the fact that economists are recent arrivals to studying the effects of media, an area of research that has been examined by other fields for a much longer period of time. As such, it is easy for these new arrivals to ignore the important research done in other fields and the accumulation of knowledge that has occurred over the decades in which economists played almost no role in this research area. It is also easy for fields that have a more established

Table 1. *Summary of Natural Experiments by Economists Related to the Effects of Media*

Paper	Year	Media Exposure	Natural Experiment	Outcomes	Main Finding
Dahl & DellaVigna	2009	Violent movies in theaters	Temporal variation in the violence level of blockbuster movies	Violent crime	Each million people watching a violent movie decreases violent crime by 1.3% during the hours the movie is in the theater and by 1.9% in the hours immediately after exposure
Card & Dahl	2011	Unexpected emotional cues from local NFL games	Unexpected wins and unexpected losses provided by comparing final NFL game outcomes to pregame point spreads	Intimate partner violence	Upset losses lead to a 10% increase in intimate partner violence; a loss when the team was expected to lose or have a close game has small and insignificant effects
Olken	2009	Television and radio	Differences in television and radio signal strength due to the topography of villages in Indonesia	Participation in community organizations and measures of trust	An additional channel of television reception leads to 7% fewer social groups, and adults attending 11% percent fewer group meetings
Gentzkow & Shapiro	2008	Television as a preschooler	Variation in the timing of when television was introduced to different local markets in the United States during the 1940s and 1950s	Test scores in mathematics, spatial reasoning, verbal, and reading	Each additional year of access to television increased average test scores by 0.02% of a standard deviation
R. Jensen & Oster	2009	Cable television	Variation in the timing of cable television in rural India	Attitudes about domestic violence, son preference, women's autonomy, and fertility	The introduction of cable television decreases son preference by 70%, the autonomy index by 41%, the number of acceptable beating situations by 46%, and the probability of being pregnant at time of survey by 53%
Chong & La Ferrara	2009	Soap operas on television	Variation in the timing of availability of the Rede Globo network, the major provider of soap operas in Brazil	Share of women who are separated or divorced	The availability of Rede Globo increases the probability of separation or divorce by 7%
La Ferrara, Chong, & Duryea	2008	Soap operas on television	Variation in the timing of availability of the Rede Globo network, the major provider of soap operas in Brazil	Fertility rates	The availability of Rede Globo decreases the average number of children by 1% and the probability of giving birth in that year by 6%
DellaVigna & Kaplan	2007	*Fox News* on television	Variation in the timing of when *Fox News* became available in different parts of the United States	Republican vote share and voter turnout	Towns where *Fox News* was introduced had a 0.4 to 0.7 percentage point higher Republican vote share in the 2000 presidential elections compared to 1996

history of research in this area to discount the results of economists who are new arrivals to this research area and in the nascent stages of contributing to this research question.

The interdisciplinary nature of the conference that led to this special issue illustrates the degree to which important advances in understanding can occur when considering the approaches of multiple fields. Ultimately this type of interdisciplinary interaction can lead to a more comprehensive view of the effects of media on important family outcomes. This article highlights some of the ways in which the economist's approach can complement the important research findings of other fields. First, our discussion of the effects of movie violence illustrates the importance of considering both the *exposure effect* and the *time-use effect* of media. The total effect will depend on both the content of the media and the activities that are displaced during the time spent using the media. Second, the natural experiments that we describe provide one way to study the long-run effects of media on important outcomes (such as divorce, fertility, and domestic violence) for which traditional experiments would be unethical or immoral and handles the challenging issue of unobserved heterogeneity.

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