

News media coverage of crime and violent drug crime: A case for cause of catalyst?

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ABSTRACT

Evidence about the relationship between exposure to media violence and criminal activity remains mixed. While some scholars argue that exposure to violent media content “triggers” crime and aggression, others contend that media may influence crime, but only as a source of information about techniques and styles, not as a motivation for crime. This debate has critical implications for criminal justice academics as calls for policy are regularly made on the basis of research in this area. This article contributes to this literature by presenting detailed empirical evidence of how media coverage of violent crimes affects homicides perpetrated by drug traffickers at Mexico, and their crime style. With an empirical model that addresses possible bidirectionalities between drug homicides and media coverage, we tracked 32,199 homicides, their stylistic characteristics, and their coverage by the press. Our results show that when media covers drug homicides it influences the probability that other criminals use similar styles of crimes, but it does not change overall rates of homicidal activity. This is evidence against the “trigger” hypothesis, and in favor of “copycat” effects.

Cite as: Rios, V. and Ferguson, C. (2018) News media coverage of crime and violent drug crime: A case for cause of catalyst *Justice Quarterly*. Forthcoming.

1. Introduction

A substantial and important portion of criminal justice research is concerned with environmental, situational, or systemic factors that cause, or are likely to cause, criminal behavior. As part of this rich literature, the role that media coverage has in shaping criminal behavior and beliefs about the justice system has long been an interest of criminal justice studies.

In essence, there are two sides to the debate. The first, identified with the “General Aggression Model” (DeWall, Anderson, & Bushman, 2011; Gilbert, Daffern, Talevski, & Ogloff, 2013), argues that exposure to media coverage of violent crimes “triggers” the development of aggressive attitudes or behaviors and desensitizes people to actual violence Anderson, Bushman, Donnerstein, Hummer, and Warburton (2015); DeLisi, Vaughn, Gentile, Anderson, and Shook (2013); Laser, Luster, and Oshio (2007). In opposition to this theory, some studies have found no solid evidence of such effects

Viridian Ríos would like to thank Mylene Cano for superb research assistantship, and Rosalee Clawson, Aaron Hoffman, Brad Holland, Jay McCann and Brian Phillips for outstanding feedback. A number of anonymous reviewers made this paper better.

(e.g. Ferguson, Olson, Kutner, and Warner (2014); Schwartz and Beaver (2016)). These scholars feeling more comfortable interpreting media coverage of violent crimes as a “rudder” of crime, meaning a factor that can shape criminal behavior, influencing, for example, the style of a crime (stylistic rather than motivation modeling which we henceforth refer to as copycat”), but does not cause it (Chadee, Surette, Chadee, & Brewster, 2017; Doley, Ferguson, & Surette, 2013; Ferguson et al., 2008; Savage & Yancey, 2008; Surette, 2013). Media coverage of violent crimes provide stylistic inspiration (Coyne, 2007; Ferguson & Colwell, 2017; Surette, 2011, 2014, 2015).

Overall, evidence regarding the relationship between exposure to media coverage of violent crimes, and violent crime remains weak and mixed (Doley et al., 2013; Savage & Yancey, 2008). Although it was often previously assumed that clear links between media violence and societal violence existed (Strasburger, 2007), such concerns have not replicated in more recent research (e.g. DeCamp and Ferguson (2017); Markey, Markey, and French (2015)). To advance these debate, scholars have identified the need to obtaining better measures (Coyne, 2007; Surette, 2014) such as to reduce concerns related to methodological flexibility and false positive results, exploring fictional and non-fictional media portrayals (Ferguson et al., 2008; Savage & Yancey, 2008), and delving into different types of crimes (Surette, 2013). Related to the latter two points, it is not unreasonable to suggest that news media may have more influence on viewers than fictional media given that viewers may assume news media is more factual. Further, it is possible that media impacts may exist for some types of crimes, but not others.

This paper contributes to advancing criminal justice literature by developing a study that addresses these concerns. We test the relationship between exposure to news media coverage of drug-related homicides, and further drug-related homicides, using a uniquely detailed, non self-reported measures of media coverage and criminal behavior.

Criminal justice researchers trying to quantitatively test the possible effects of media coverage of violent crimes may find interesting insights in our study because of the level of detail of the measures we gathered. We recorded 32,199 homicides carried out by drug traffickers, and we measured the stylistic characteristics of each crime, whether each of these homicides was covered by the media, and how it was covered. This panel of 169 weeks allowed us to identify, for example, the share of drug traffickers’ homicides that were covered by the printed press, and whether the details of such crimes, including stylistic characteristics, were published. Importantly, crime rates and rates of copycat crime are not self-reported by offenders but are obtained from official statistics or, in the case of copycat crimes, subsequent news media coverage.

The results of our study provide empirical evidence to sustain that “rudder” theories are better positioned to explain how exposure to media coverage of violent crimes affects criminal behaviour than are those that assume a causal connection regarding motivation to commit crime. When media covers the homicides of drug traffickers, such coverage is not associated with more homicides, but criminals do use similar crime styles to the crimes that were covered by the press. In other words, traffickers are more prone to be ruddered “copycats” than to be “triggered” into violence by the media (Surette, 2013).

Our paper should be understood as part of a trend to conduct research in places outside the US, to enlighten relevant criminal justice debates. Cross-cultural research can help elucidate the applicability of relevant theories across diverse groups to ensure its practical applicability to such groups. For example, Brazil has been used to study psychopathy in criminal and forensic psychiatric populations (De Oliveira-Souza, Moll, Azevedo Ignácio, & Hare, 2008), England and Wales to identify triggers of violence in

prisoners and forensic patients (Freestone, Ullrich, & Coid, 2017), Australia to validate the Ontario Domestic Assault Risk Assessment (Lauria, McEwan, Luebbers, Simmons, & Ogloff, 2017), and China to test whether distributive justice and procedural justice are predictors of job satisfaction among community correctional staff (Jiang et al., 2016). Cross-national and cross-cultural assessment of theory can help to understand the limitations of a given theory and whether it is broad enough to transcend its culture of origin.

The rest of the paper proceeds as follows. The first section discusses the existing literature about media coverage of violent crimes, and crime. The second section presents the hypotheses and presents the case study. The third section presents the empirical test. The fourth and fifth sections present results and additional testing. We conclude by discussing how the paper contributes to the literature, and by suggesting possible avenues for future research.

2. Media coverage of violent crimes, and crime

The question of whether media coverage of violent crimes may have effects on crime rates or on styles remains highly controversial (Doley et al., 2013; Ferguson et al., 2008; Savage & Yancey, 2008)).

Overall, two theories have been used to explain the effects that media coverage of violent crimes may have on criminal behavior: The General Aggression Model (DeWall et al., 2011; Gilbert et al., 2013), and the “Catalyst” model of violent crime (e.g. Ferguson et al. (2008); Surette (2013)).

Supporters of the General Aggression Model (GAM) are confident that exposure to media coverage of violent crimes is one of the factors that “triggers” human aggression though evidence for such effects is typically correlational rather than experimental (proponents of the GAM claim consistent evidence for experimental effects on milder aggression, a position contested by other scholars, see Savage and Yancey (2008)). Scholars who advocate for the GAM contend that the media is partially responsible for deviant behavior (Laser et al., 2007), and contributes to violence by desensitizing people to the pain and suffering of others (Helfgott, 2015).

Those who favor the GAM contend that prolonged exposure to violent media can fundamentally alter a person’s personality, causing them to become callous and volatile. For example, some believe that at least 30 separate occurrences of gun violence were inspired by the Russian Roulette scene from the movie *The Deer Hunter* (B. Gunter, 2008), that the shooter in The University of Virginia Tech massacre was copying events from an action movie (Nizza (2013), although evidence for these claims were lacking), and that there have been many instances of crime inspired by movies (Sparks, 2015). Some scholars have also found evidence of increased engagement in physical fights among individuals exposed to violent video games (Anderson, Gentile, & Buckley, 2007; Ivory, Ivory, & Lanier, 2017), as well as aggression among listeners of profanity laced games (Ivory & Kaestle, 2013), and violent song lyrics (Anderson, Carnagey, & Eubanks, 2003). Individuals with a preexisting history of delinquency of violence are sometimes considered particularly at risk for violent media effects (DeLisi et al., 2013). Certainly individuals involved in criminal enterprises are not passive viewers and media viewing can be expected to interact with the political culture of Mexico, gang culture and the specific motivations of criminal gangs. However, given claims that significant proportions of violent crime could be specifically attributed to violence in media (e.g. Strasburger (2007)), from this theoretical perspective we would

still expect to find a relationship.

Notwithstanding the research above, many studies have shown a lack of correlation, or lack of causality, between media coverage of violent crimes, and aggression (Doley et al., 2013; Ferguson et al., 2008; W. D. Gunter & Daly, 2012; Savage & Yancey, 2008; Surette, 2013). Some studies have suggested that violent movies (Dahl & DellaVigna, 2009) and video games (Markey et al., 2015) are associated with reductions in violent crime in the United States. Some criminologists have specifically referred to linking violent media to violent crimes as a “myth” (e.g. Fox and DeLateur (2014)).

Thus, in opposition to the General Aggression Model, some scholars have developed a series of theories that characterize media as a “rudder” of crime. These scholars point out that we are living in the most peaceful epoch in human history, despite the ubiquity of media coverage of violent crimes (Pinker, 2011). They also argue that if significant and causal media effects could be found, they would not be large enough to change aggregated crime rates in notable ways (DeCamp & Ferguson, 2017; Surette, 2013).

Indeed, research has shown that media coverage of violent crimes does not reduce empathy for the victims of real violence (Ramos, Ferguson, Frailing, & Romero-Ramirez, 2013) and does not create more aggressive behavior (Savage & Yancey, 2008). Also, several studies have shown that playing violent video games or watching violent TV does not have a criminogenic impact (Breuer, Vogelgesang, Quandt, & Festl, 2015; Ferguson et al., 2008; Ferguson, San Miguel, Garza, & Jerabeck, 2012; Ferguson & Savage, 2012; Savage, 2004; Surette & Maze, 2015).

Those endorsing the “rudder” theory neglects that individuals are “passive receptacles of learning”, and instead conceive individuals as “active shapers and processors of media culture” (Elson & Ferguson, 2014; Ferguson, 2015). In other words, these models hold that the interaction between media and behavior is intermediated by the media user (Phippen, 2017). Furthermore, proponents of these theories argue that environmental factors and psychological predispositions are behind disruptive behavior disorders, rather than just exposure to media (Ferguson & Dyck, 2012; Ferguson & Savage, 2012).

Adherents of the “rudder” theory suggest that, rather than causing crimes, media might provide stylistic ideas to potential criminals. i.e. promote copycat crime (Doley et al., 2013; Surette, 2011; Surette & Gardiner-Bess, 2013; Surette & Maze, 2015). In other words, media is source to identify crime techniques, but not a crime motivator. The work of Surette (2013), for example, analyzed anonymous surveys of 574 male and female correctional inmates. Surette concluded that the media influenced the style of crimes by providing instructional models to predisposed individuals, yet it did not prompt crime per se. He coined the term “ruddering” to illustrate how media portrayals of criminality shape the stylistic form the crime takes on, instead of acting as a direct catalyst for the crime itself.

3. News media effects

Interestingly, much of the coverage of the media effects debate has focused on fictional media ranging from books (e.g. Devilly, Brown, Pickert, and O’Donohue (2017) through video games. Comparatively little has examined the direct impacts of news media coverage of violent crimes on imitative or rudder theories of crime perpetration. A fair amount of research does examine the potential for new media to cultivate beliefs about crime (Chadee et al., 2017; Oliver & Fonash, 2002), although research on direct

effects is rarer.

Some research has suggested that copycat effects may reflect internal motivations more than passive imitation (Chadee et al., 2017). This is generally supportive of the rudder rather than imitative perspective, insofar as that individuals seek opportunities to model desired behaviors rather than acquire motivations themselves directly from media. However, more research would certainly be welcome.

4. Drug-related homicides

For the purposes of the current paper we are particularly interested in the issue of drug-related homicides. Such homicides occur in relation to the larger drug trade, typically carried out in relation to cartels and gangs fighting for turf to produce, transport or sell illegal substances (Celis, Lujan, & Ponce, 2018). The relation between drug crimes and homicide has been known for some time (Chauhan et al., 2011). Homicide can be understood as a struggle for regional political control, a practice ordered by cartel leaders rather than spontaneous violence of foot soldiers, and as an expansion strategy from solely drug trafficking to other kinds of organized crime (Campbell & Hansen, 2014). In this sense, drug-related homicides bear some resemblance to terroristic homicides (Phillips, 2018).

Some evidence has suggested similarities between domestic related extremists and gang-related extremists, and gang extremists may resemble domestic terrorists more than they do non-extremist gang members (Pyrooz, LaFree, Decker, & James, 2018). There is some speculation that media, and social media in particular, can be used in the recruitment and radicalization of terrorist group members (Jones, 2017). Thus considering media effects related to gang-related homicides is not unwarranted (Rios & Rivera, forthcoming).

Thus, similar incentives seem to exist for terrorists as for drug-related gang extremists (B. Hoffman, 1997; Surette, Hansen, & Noble, 2009) e.g. Iqbal (2015). Terrorists use press coverage to promote an appearance of strength (Conrad & Greene, 2015; Kearns, Conlon, & Young, 2014) with the goal of advancing their criminal objectives by inducing fear or spreading propaganda (Abrahms & Conrad, 2017; A. M. Hoffman, 2010; Wright, 2009). Actually, there is some evidence that these organizations may time their attacks to coincide with the news cycle (Krueger, 2008), and follow media coverage to better target their cross-border attacks (Asal & Hoffman, 2016). Furthermore, TV news outlets play an important role in mediating terrorist messages (Iqbal, 2015). In fact, some criminal organizations run their own newspapers, radio stations, or websites (A. M. Hoffman, Shelton, & Cleven, 2013), and even have proved skillful in the use of social media and cyber technology (Farwell, 2014). For example, social media has played an essential role in the Jihadists' operational strategy in Syria, Iraq, and beyond (Klausen, 2015).

5. Criminal justice policy

One of the challenges for criminal justice policy has been in regards to what to do with disparate information regarding media effects. On one hand, as indicated above, research on media effects has not returned clear, consistent results that would be of value for policy makers. On the other hand, professional organizations such as the American Psychological Association or American Academy of Pediatrics appear to be

under pressure from policy makers to provide the answer as to whether media effects are real or not. This pressure appears to have, at times, caused such organizations to make false statements regarding the consistency of effects (Cofnas, Carl, et al., 2018; Copenhaver, 2015).

One concern is that the issue of media effects may provide a red herring to criminal justice policy insofar as media effects may distract policy makers from causes of homicides with better empirical footing. In some cases, this may be purposeful, such as when violent video games are blamed for mass shootings, despite clear evidence at this point that violent video games play little causal role (Fox & DeLateur, 2014). The same can be said for news media. Some scholars have suggested, for instance, that news media should be discouraged from releasing the names of shooters (Lankford & Madfis, 2018), in press. Given this proposal has few evident downsides, it's easy to support, however the actual effectiveness on reducing mass shootings remains unknown.

As such, it is important that research provide clear data regarding the impact of media portrayals of crime on actual homicides. Such research can help set public policy priorities for criminal justice.

6. Research design

An important difficulty contributing to the empirical intractability of the aforementioned debate is the fact that the relationship between media coverage of homicides, and further homicides may be a vicious cycle (Savage & Yancey, 2008).

On one hand, to the extent that the media is driven by sensationalism, the media has an incentive to pay more attention to more gruesome stories (Chermak & Chapman, 2007). These hypotheses are relevant because that media front-pages prioritize content with higher audience ratings and editor's approval (Coddington, 2014; Fink & Schudson, 2014; Reiner & Newburn, 2007). In other words, the media operates under criteria of newsworthiness (Gruenewald, Pizarro, & Chermak, 2009). Thus, homicides may induce media coverage if crimes are strategically planned to be scandalous and provocative (Nacos, 2002; Wu, 2000). Furthermore, drug traffickers are clearly a newsworthy and lucrative topic for the media as they are one of the most popular topics of media attention within the crime genre (Rawlinson, 2016).

On the other hand, to the extent that criminals benefit from the direct/indirect reputational gains of coverage, criminals have an incentive to make their crimes increasingly gruesome. Because of these dynamics, it is difficult to tell who is really influencing who. We know that criminals, particularly when they operate in groups, may have an interest in committing overtly violent actions for strategic purposes. Criminals could be expected to copy "crime styles" featured by the press, not only because the media could function as an "instructional model" (Surette, 2011, 2014), but also because criminals may want media attention. Criminal groups may benefit from visibility because it helps them to intimidate their enemies (see for example Durán-Martínez (2015) and J. M. Brown (2017)).

To address the bidirectionality of media coverage and homicides, and to determine whether these relationship follows the logic of "trigger" or "rudder" arguments, four hypothesis will be tested. Two basic hypotheses:

H1 (i.e. trigger): The higher the level of media coverage of homicides, the greater is the likelihood that criminals are violent

H2 (i.e. rudder): The higher the level of media coverage of homicides, the greater is the likelihood that criminals use styles of violence similar to the ones that had been covered by the media.

Two reciprocal hypotheses:

H3: The more common homicides are, the greater the likelihood that media covers it.

H4: The most common certain styles of crimes are, the greater the likelihood that media covers those styles.

7. Data

To measure the effects of media coverage of violent crime on homicide, we constructed a state-level panel data set for 32 states (all Mexican states) for 169 weeks from October 6th, 2007 to December 31st, 2010¹. Every week we measured (a) the number of drug traffickers' homicides (*Homicides*), (b) the share of drug related homicides that were "claimed" using a narco-message (*credit-taking*), (c) media coverage, and (d) media quality.

First, to measure "Homicides", we obtained official registries of drug traffickers' homicides from Mexican authorities. These are homicides that were officially attributed to drug traffickers by Mexican intelligence and security institutions (SNSP, 2011), and that were monthly reported from October 2007 to September 2011. To construct this variable, we gathered information about 32,199 drug traffickers' homicides. A homicide was considered as conducted by a drug trafficker if it met six criteria². Overall, drug traffickers' homicides represent 95% of all homicides perpetrated during those years and in those areas.

Because our media variables are reported weekly, we divided the total number of homicides by the number of weeks. When a week fell in between two months, we proportionally attributed the number of homicides according to the share of the weeks that fell in each month.

Second, to measure "Crime Style", we constructed a database that identifies a stylistic feature that sometimes accompany drug traffickers' homicides: credit-taking banners. Credit-taking is not a behavior typically discussed within traditional theories of media effects such as the GAM, but can be considered a stylistic behavior consistent with the Catalyst Model (Ferguson et al., 2008). In this sense credit-taking can be considered a stylistic behavior that is not essential to the practicalities of the crime itself, but which may related to motivations that are intrinsically satisfying to the perpetrator. As such, they are a measurable indicator of the degree to which perpetrators

¹We use weeks as our frequency measure because media coverage measures were only available per week, starting on October 6th, 20107 (Reforma, 2017). We restricted our data set to 2010 because starting 2011, Mexican media signed an agreement to stop covering drug traffickers' homicides, thus probably limiting our capacity to properly measure the quality of media coverage (Molzahn, Ríos, & Shirk, 2012). All data will be a public for reproduction and validation.

²These were (i) use of high-caliber firearms, (ii) signs of torture or severe lesions in victims, (iii) bodies found at the crime scene or in a vehicle, (iv) victims that were taped, wrapped, or gagged, (v) murders that happened in a prison and involved criminal organizations, and (vi) if one of several "special circumstances" occurred. Among these "special circumstances" are whether the victim was abducted prior to assassination (known as a "levantón" in Spanish), ambushed or chased, whether the victim was an alleged member of a criminal organization, and whether a criminal organization publicly claimed responsibility for the murder (Ríos, 2013).

may be influenced in “style” or crime if not the commission of crimes themselves. This allows for a test of the Catalyst Model.

Credit-taking banners, also known as “narco-messages” (Atuesta, 2017; Campbell & Hansen, 2014; Durán-Martínez, 2015; Martin, 2012; Mendoza Rockwell, 2016) are used by drug traffickers’ to take-credit for their criminal actions, or to clarify their degree of responsibility for them. Narco-messages may also be displayed to intimidate potential victims, to communicate with local citizens, or to give instructions to investigators, policemen, or journalists (Martin, 2012).

The content of the banners may be a threatening maxim like “you cannot be on good terms with both God and the Devil”, or an appeal to the public, like the claim that “this (battle for turf) is for the good of all”, or like the banner dedicated to “the brave, noble, and loyal people” wishing them “Merry Christmas, ho, ho, ho”. Narco-messages are a creepy stylistic innovation that stretches the boundaries of traditional graffiti with its bizarre mimicry of the formality of Mexican political campaign propaganda (Salopek, 2011).

The use of credit-taking messages is not exclusive to Mexico. Similar criminal messaging has happened in places such as Colombia, Southern Italy, and in numerous U.S. cities (see Cowell (1992), Martin (2012), and Ortiz (2013) as cited by B. Phillips and Ríos (2017)).

Criminal messaging is also a major part of terrorism, which has been described as violent propaganda or violent communication (e.g. Schmid and De Graaf (1982)). A line of research has examined why terrorist groups sometimes claim their attacks (Wright, 2009). Among reasons for doing so are inter group competition (A. M. Hoffman, Jengelly, Duncan, Buehler, & Rees, 2010), communication within the group (K. D. Brown & Hamilton-Giachritsis, 2005), and operation in democratic countries (Min, 2013). However, this literature also established that there are reasons militant groups do not seek credit. Such reasons could be that the attack was especially heinous, or the desire to avoid a bad reputation (Abrahms & Conrad, 2017; A. M. Hoffman, 2010).

To gather information about credit-taking banners, we performed massive amounts of queries with online search engines using “narco-message” as our keyword.

Following Coscia and Rios (2012), we relied on Google as our main search engine to obtain content. We extracted information about narco-messages from public blogs and forums ran by citizens who collect information about narco-messages (e.g. Blog del Narco), specialized online websites, Youtube, and local/national newspapers.

Yet, unlike Coscia and Rios (2012)), we gathered a team of researchers to read, filter, and classify all the results. We did it to ensure that each narco-banner was not double counted if it was covered by different media sources using different language. Also, this allowed us to identify if the narco-messages was accompanied by a homicide, and if the narco-message was reported on detail.

Out of a total of 32,199 drug-related homicides we could find that 857 were accompanied by a narco-message. Out of 1,731 narco-messages, 1,293 were detailed. Out of all narco-messages, 56% came from the local newspapers, 31% from national press, 7% from local blogs/forums, 3% from Youtube, and 2% from international newspapers. Because 63% of all narco-messages were reported by local newspapers or local blogs/forums, we allow us to assume that people committing homicides at a locality are reading these local news. Every link used to extract information is available under request.

We cannot ensure that our data set contains all the narco-messages ever displayed with a homicide in Mexico, but only those that were reported online somehow. This

feature may bias our results particularly for areas with less internet access. Even if this is problematic, we believe that this does not significantly change time trends as internet access did not change significantly during the 169 weeks that this study covers. The percentage of households with internet access only grew 4.9 pp from 2008 to 2010 (18.4% to 23.3%).

Our measure, “Credit-taking” is the share of weekly homicides that had a credit-taking banner. This was calculated as(1)

$$CreditTaking_{it} = \frac{HomicideswithaNarcomessage_{it}}{Homicides_{it}} \quad (1)$$

The measure takes values from 0 to 1, where 1 means that all homicides in week t, state i, were claimed with a banner. This measure distributes approximately normal.

Third, to create the variable “Media Coverage”, we identified the amount of drug traffickers’ homicides that were covered by independent counts of drug traffickers’ homicides conducted by the press. Beginning in October 6th, 2007, news-media organizations started counting the number of drug traffickers’ homicides per week using a similar methodology than the government. The most comprehensive coverage was done by Reforma, a major Mexican newspaper with a large pool of local correspondents and alliances with local newspapers in every state. Other national newspapers like Milenio and El Universal also had their own independent counts, alliances, and correspondents (Ríos, 2013). The “Justice in Mexico Program” has also gathered statistics regarding press counts of traffickers’ homicides from 2006 to 2017 (Milenio, 2017; Reforma, 2017). All of these “press counts” were reported digitally (at the newspaper website) and in the printed version.

Per each state i, and week t, the measure of “Media Coverage” is given by2:

$$MediaCoverage_{it} = |Homicides_{it} - Homicidescountedbythepress_{it}| \quad (2)$$

Out of the 32,199 drug traffickers’ homicides, 23,737 were covered by the press. Coverage is very different across time and geography. For example, although the press covered 76% of the homicides in 2010, in 2007 it only covered 63%. Also, in Oaxaca, 26% of drug traffickers’ homicides were not covered, meanwhile, in Querétaro, all of them were covered by the press. Before using this variable, we logged it to normalize its distribution.

Finally, to identify the quality or specific detail of media coverage (*Media quality*), we measured the share of narco-messages that were covered in detail. We classified coverage a narco-message³ as “detailed” when the specific content of the narco-message was reported. This means that messages like “Esto les va a pasar a los que no respeten a los grandes jefes de La Familia” (this will happen to those that don’t respect La Familia’s great chiefs) could be read in their entirety in the newspaper (El Sol de Toluca 2009). Coverage classified as “non-detailed” was when the reporter only hinted at the existence of a narco-message without explicitly quoting its content. The share of detailed messages over total messages is represented by the variable “Media Coverage Quality”. Out of our total sample, 75% of the narco-messages were detailed. In this sense we refer to media quality to indicate the degree to which specific information regarding the media message was reported, not quality in the sense of validity. We do

³All news used to compile the datasets were searched in Spanish language.

note that news articles might have been detailed in other respects (e.g. information on the victim), thus our variable refers only to one aspect of detail.

Descriptive statistics of our measures of homicides, media coverage, quality of media coverage, and credit-taking crime style are shown in Table 1. Of the total events covered by the media, on average only 11% are reported in detail. On average, the media fails to cover 3.12 homicides per week, per state; and there are 5.95 murders per week. Also, on average, drug traffickers take credit for 8% of their homicides. Our time series are mostly normally distributed.

[Table 1 about here.]

8. Empirical test

To model bidirectionalities between media coverage of homicides, and actual homicides, we fit a panel regression of each dependent variable on lags of itself and on lags of the dependent variables using generalized method of moments (GMM). This specification, generally known as panel vector autoregression (VAR) (Abrigo & Love 2015), is an efficient way to show the co-movements of multiple time series that originated in the macroeconomics literature as an alternative to multivariate simultaneous equations (Sims, 1980, Holtz-Eakin, Newey & Rosen, 1988).

Various alternative estimators based on GMM have been proposed to calculate consistent estimates for dynamic panels, especially in fixed T and large N settings (Canova & Ciccarelli 2013). Yet, our specification allows to better deal with a large, balanced panels like the one we are making inference from. Our panel VAR consists of n lags of media coverage and crime in the following two equations (3) (4):

$$x_{it} = \beta_0 + \sum_{j=1}^n \beta_{1j} x_{i(t-j)} + \sum_{j=1}^n \beta_{2j} z_{i(t-j)} + e_{x_{it}} \quad (3)$$

$$z_{it} = \beta_0 + \sum_{j=1}^n \beta_{1j} z_{i(t-j)} + \sum_{j=1}^n \beta_{2j} x_{i(t-j)} + e_{z_{it}} \quad (4)$$

Note that β_1 's and β_2 's are matrices of coefficients for each state i, in week t. We have 32 states and 169 weeks. The terms z (“homicides” or “credit-taking”, depending on the identification) and x (“media coverage” or “media quality”, depending on the identification) are vectors of exogenous variables that may shift the reaction function up or down, and e_x and e_z are the vector error terms.

Data were nested at the state level. To account for this nesting, we clustered standard errors at the state level. We also used robust standard error estimations in all models. We tested each variable for unit roots or stationarity in using the LevinLinChu (LLC) (2002) test. Levin, Lin, and Chu (2002) recommend using their procedure for moderate-sized panels, with perhaps between 10 and 250 individuals and 25 to 250 observations per individual, with panels that are strongly balanced, and where the ratio of the number of panels to time periods tends to zero asymptotically. All these features are fulfilled by our database. We allowed an automatic selection of lags using

the AIC criteria, with a two month limit (4 weeks). As Table 2 shows, in all cases, we reject the null hypothesis, thus concluding that our series are stationary.

[Table 2 about here.]

To estimate the optimal number of moments and model, we followed Andrews and Lu (2001). We calculated MMSC-Bayesian information criterion (BIC), MMSC-Akaike’s information criterion (AIC), and MMSC-Hannan and Quinn information criterion (QIC) for a series of panel vector autoregressions of order up to 4. We decided to set a maximum of 4 lags because journalistic sources agreed that one month (about 4 weeks) is typically considered the most a note can last on the media attention. Our results, shared at the appendix, show that homicide models tend to favor an identification of maximum 2 moments, and credit-taking models tend to favor an identification of maximum 4 moments. Therefore, following general conventions, we ran all models with a maximum 4 lags, and for homicide models we ran models with 2 lags as robustness tests (appendix). We could improve efficiency by including a longer set of lags as instruments. This, however, has the unattractive property of reducing observations. Note that, in all models, we removed fixed-effects per state using forward orthogonal deviation or Helmert transformation.

As with any other dynamic model, the order of the variables is mostly untestable. In other words, there is not a “right” ordering. Order has to be justified based on intuition/theory. In our case, we used crime-related variables (homicides or credit-taking) as the first variable in the model because we consider that it may more exogenous than media coverage. It has been well documented that media operates under criteria of newsworthiness (Gruenewald et al., 2009), thus, homicides may induce media coverage if crimes are strategically planned to be scandalous and provocative (Nacos, 2002; Wu, 2000). Yet, there is still plenty of debate with respect to media effects on crime. In any case, because we do not have a definite position as to which variable should be first, we tested all models following a distinct order and the interpretation of all our results remained constant.

Every panel VAR is accompanied by a Granger test, which is a joint significance test to check the significance of the coefficient of our lagged impulse and response variables. A large empirical literature supports the use of Granger causality tests (?) for testing cycles (Gambacorta, Hofmann, & Peersman, 2014; Huang, Hwang, & Yang, 2008; Jaeger & Paserman, 2008) and argues that it is a relevant tool for crime studies with time series analysis (Hsu & McDowall, 2017; Ramirez, 2013; Saridakis, 2004). Note that residuals need to be orthogonal to control for other shocks.

Our Granger test amounts to testing the joint significance of the coefficients on lagged values of the impulse variable in a regression of the response variable on lagged values of both response and impulse variables. If the signs of the impulse variable are significant, we would have found evidence that the response is “Granger-causing” it.

We also provide additional post-estimation analysis like non parametric impulse reaction functions, forecast error in variance decomposition, and stability conditions. An impulse-reaction function is a signal processing technique that allowed us to take our defined dynamic system with an input signal, called an impulse, and to describe the reaction of the system to it as a function of time. The forecast error in variance decomposition is useful to measure how relevant each shock is to the explanation of each variable in the equation system. Stability implies the model is invertible and has an infinite-order vector moving-average (VMA) representation. We followed (Love & Zicchino, 2006) to transform the system of equations into a recursive auto-regressor

vector with Choleski decomposition of variance-covariance matrix residuals. The impulse variable will be reacting to the response variable if, conditional on lagged values of the response variable, lagged values of the impulse variable have predictive power for the current value of the response variable.

It is important to restate that our empirical test, and the goal of this paper, is to identify if there are bidirectionalities between media coverage of violent crimes, and crime. More research would be needed to evaluate how other factors may be impacting media coverage. Future papers could address whether high levels of literacy, intense conflict among criminals, violence against the press, or other variables are also presenting correlations.

9. Results

Table 3 shows the relationship between media coverage and media quality, and homicides. For both reaction functions, we estimated panel vector auto-regressors with four lags (H1 & H3). Columns (1) and (2) show the relationship between media coverage and homicides. Columns (3) and (4) show the relationship between media quality and homicide rates.

[Table 3 about here.]

Results show that neither media coverage, nor media quality, are significant predictor of homicides, and that media coverage and media quality inconsistently react to homicides. Hansen’s J null is rejected in all models, and the Granger tests show that we could find some impact of media coverage and media quality on homicides, but this effect is not stable and small.

Tables 4 presents the relation between media coverage and media quality and credit-taking style (columns 1 and 2), and between media coverage and credit-taking homicide style (columns 3 and 4) (H2 & H4). In sharp comparison with previous results, we can see that credit-taking style react in a strongly statistically significant way to media coverage. Our Granger test supports these results. We reject the hypothesis that media coverage does not “Granger-cause” credit-taking. The relationship between media quality and credit-taking is weaker but still present. Hansens J null is rejected in all models. Interestingly, we also see almost no effect of credit-taking on media coverage and media quality.

[Table 4 about here.]

Overall, our results show that media coverage influences credit-taking style homicides perpetrated by drug traffickers operating at Mexico, but does not motivate more homicides. Violent media could be influencing the characteristics of homicide, but does not cause the homicide itself. This is consistent many recent findings showing that drug traffickers care about being covered by the media and devote energy to getting attention (Atuesta, 2017; Durán-Martínez, 2015; Gambetta, 2009). Drug traffickers could care about media coverage because attention may help trigger specific state reactions (Durán-Martínez, 2015). For example, media coverage provides power to drug traffickers executions by spreading performative acts of fear (Lantz, 2016). Also, the mafia seeks media coverage to portray the toughness and power of its organization (Gambetta, 2009). Militarized international conflicts and civil wars have similar dynamics (Bell, Frank, & Macharia, 2013; Miller & Albert, 2015; Miller & Bokemper, 2016).

10. Exploratory results

The following analyses involve those that were not an initial part of our analysis plan, but which were considered as we examined our data and are less theory-driven. As with all exploratory data, these should be considered as proof-of-concept rather than definitive proof as false positive results can be higher for exploratory analyses. However, we do include the 21-word statement of Simmons, Nelson, and Simonsohn (2012) to certify our intent was not to engage in HARKing: “We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study”.

To interrogate our data further, we tested for heterogeneous effects driven by the strength of the drug cartels’ territorial entrenchment. If media coverage serves as inspiration for homicide style (H2), as we suggested in our previous models, then we could expect that media coverage may have a larger effect in areas where drug cartels are more entrenched. This is straightforward. We should expect that having more criminal organizations is a proxy of having more criminals that could be susceptible to be influenced by the media.

We determine whether a state is drug cartel territory by identifying the presence of drug cartels in different territories over time.

To measure drug cartel presence, we relied on a published big-data framework that uses a text-analysis algorithm to extract web content about recorded criminal activities by subnational economy. The algorithm “reads” digitalized records, news content, blogs, and Google-News indexed content searching for instances in which drug cartel operations are mentioned. The Python crawler was created to extract JavaScript Object Notation using unambiguous query terms to perform text analysis. The final data, cleaned using a hyper-geometric cumulative distribution function, includes 2,449 sub-national economies, and 178 “actor terms” associated with traffickers and drug cartel organizations. Each actor was classified accordingly as part of one of the 13 drug cartels and as a residual category. We know about 13 drug cartels operating in Mexico for 19 years (1991 - 2010). Drug cartel organizations operate in 713 municipalities in Mexico, and along most of the US-Mexico border. A more detailed description of the methodology that we followed can be found in the published paper (Coscia & Rios, 2012).

This framework allowed us to obtain information about a phenomenon that would otherwise require large scale, expensive intelligence exercises. Most importantly, this procedure helped us to disentangle drug cartels performing violent crimes from drug traffickers that are not violent. Many of the recorded drug cartel operations are non-violent, and consist of peacefully trading, transporting, producing, or cultivating illegal drugs. This data set has also been used to study criminal activity in many other published papers (Castillo, Mejía, & Restrepo, 2014; Dube, García-Ponce, & Thom, 2016; Holland & Rios, 2017; Osorio, 2015).

Table 5 shows our estimates for the quality of media coverage and credit-taking style for two subsets: areas that are geographical bastions for drug cartels, and areas that are not. The results indicate that, if drug cartels are entrenched, homicides with credit-taking style react in a statistically significant way to media coverage. Meanwhile, locations where drug cartels are not entrenched only exhibit association between media content and the stylistic decisions made by criminals during the first week.

[Table 5 about here.]

The Granger test bolsters these findings, showing that media coverage helps to predict credit-taking homicides in places where drug cartels are entrenched, but fails to do so otherwise.

11. Conclusion

Our research was inspired by an enduring controversy: whether exposure to violent media content causes crime by "triggering" delinquency (Anderson et al., 2015; Gentile, 2016; Laser et al., 2007; D. P. Phillips & Hensley, 1984) or just provides "rudders" that guide individuals already intending to commit crime (Doley et al., 2013; Ferguson & Colwell, 2017; Ferguson & Dyck, 2012; Ferguson et al., 2008; Savage & Yancey, 2008; Surette, 2013). That is to say, the debate between the adherents of the General Aggression Model (Bushman & Anderson, 2002; DeWall et al., 2011), and the advocates of theories such as the Catalyst Model (Ferguson et al., 2008; Surette, 2013).

This debate has been difficult to resolve because measuring copycat crime presents major empirical challenges (Coyne, 2007; Surette, 2014), but also because media content and crime rates may be modeled as a self-reinforcing cycle. This would mean that media coverage may induce criminal events, and criminal events may also induce increases in violent media content, if such events are interesting for audiences.

To provide insight into the controversy, we set out to determine whether media coverage of homicides committed by drug traffickers operating at Mexico influenced their homicide rates and crime styles.

We were able to overcome the empirical challenges noted in the literature by leveraging two exceptionally fruitful and unique data sets, and by using simultaneous equation modeling. In addition, we developed an empirical specification that address the possibility that the relationship between media coverage and criminal behavior may be bidirectional. Specifically, we defined reaction functions and Granger causality tests to identify the relationships between media coverage, or media quality, and homicide rates, or crime styles.

Our results give support to the "rudder" hypothesis, rather than to the "trigger" one. We show that detailed media coverage of homicide provides criminals with stylistic inspiration (H2 accepted), but is not associated with an increase in homicide rates (H1 rejected).

Specifically, we found evidence that credit-taking homicide style tend to react to detailed media coverage. When the media covers homicides in larger detail, criminals increase the use of credit-taking style.

Additionally, contrary to common assumptions, a strong Granger causality from detailed media coverage to credit-taking homicide style shows that this relationship is mostly unidirectional (H3 and H4 are rejected in most models).

We note that our results for credit-taking style were found stronger for media coverage than for media quality. We generally find this to be reasonably consistent results, acknowledging that there is always some randomness to study results. However, this observation also does caution us to note that the overall effects of media, even for "rudder" effects, are fairly small and should not be exaggerated.

12. Policy Implications

Given that our results support a rudder versus imitative understanding of news media effects, this suggests that policies focused on news media coverage of crime are unlikely to reduce the incidence of crime. This suggests that criminal justice authorities ought exercise caution when identifying media as an avenue for reducing crime.

This is relevant to policy to the extent that policy makers are increasingly concerned to identify means to reduce violent crimes. For instance, imitation or “contagion” effects are sometimes proposed as potential causes of violence ranging from gang violence to mass shootings. This can result in efforts to promote changes to news media coverage in order to reduce the potential contagion effects of news media. We are not necessarily opposed to such efforts, nor claim our study necessarily detracts from them. However, we do have some concern that, if evidence for news media causation of crime is weak, policy makers may nonetheless be distracted by such concerns from more promising, but less sensationalized potential causes of crime such as poverty, education and occupational disparities and police corruption.

In this sense it is important to understand the magnitude of impact that policies directed at news media are likely to have on behavioral outcomes. Particularly if the magnitude of effects are small, it is important not to over promise impacts which can, paradoxically, cause harm by distracting policy makers from other concerns.

Our current analyses focused on news media rather than fictional media. Previous research has generally not been able to identify fictional media as a risk factor for violent crime. However, given that news media reports on real events rather than fictional events, there may have been reasons to suspect that news media might have had more causal impact. Our results suggest news media does not have a causal effect on the creation of crime. Consistent with the Catalyst Model, news media may have a rudder effect in terms of the nature of the crime committed, but targeting news media appears unlikely to reduce crime itself. As such, we recommend that other avenues for policy are likely to be more productive if the goal is to reduce crime.

13. Limitations and future directions

Although this paper has contributed to a better understanding of the relationship between the press and criminal behavior, future research would need to test for causal relationships beyond Granger causality. Experimental data with milder forms of aggression may also be illustrative in determining causality. As our data is developed from a correlational predictive model, it is possible that other predictors not included in our analyses may explain some of the relationships found.

Furthering this area of research is critical to the social sciences and to democratic governance because it exposes the tension between two important values: freedom of the press and the elimination of publicity-seeking crime. In addition to guiding us as we consider this issue, this research will assist with the development of better strategies to combat drug trafficking, copycat criminals, and deviant individuals who aspire to notoriety which understanding which factors have more or less impact.

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Table 1. Descriptive statistics

Variables	Mean	SD	Min	Max
Homicides	5.954	12.72	0	102
Credit Taking	0.0795	0.258	0	1
Media Quality	0.108	0.301	0	1
Media Coverage	3.124	5.403	0	77.62

Note: SD=Standard Deviation, N=5,408 for all variables. At future identifications, we logged Media Coverage to normalize its distribution.

Table 2. Levin-Lin-Chu unit-root tests

Variable	Adjusted t*	p-value
Media quality	-46.787	0.000
Media coverage	-19.886	0.000
Homicides	-12.5255	0.000
Credit-taking style crimes	-41.577	0.000

Note: 32 panels in 169 periods; lags chosen by AIC, max=4

Table 3. Crime and media

Variable	(1) Homicides	(2) Media Coverage	(3) Homicides	(4) Media Quality
Media coverage (t-1)	-0.981	0.516***		
Media coverage (t-2)	-0.711	0.437***		
Media coverage (t-3)	-0.664	0.386***		
Media coverage (t-4)	-0.818	0.403***		
Media quality(t-1)			0.258	0.106***
Media quality(t-2)			0.047	0.074***
Media quality(t-3)			0.073	0.011
Media quality(t-4)			0.332**	0.040*
Homicides (t-1)	1.193***	0.056***	1.236***	0.004
Homicides (t-2)	-0.224***	-0.026	-0.265***	-0.004
Homicides (t-3)	0.103**	-0.013	0.070***	0.008**
Homicides (t-4)	0.014	-0.014**	0.014	-0.006*
Granger test (Prob>chi2)	8.145*	102.601***	10.707**	28.154***
Hansen's J chi2		9.531e-30***		5.801e-30***

Note: *p< 0.1; **p< 0.05; *** p<0.01. Instruments : l(1/4)

Table 4. Media and crime style

Variable	(1) Credit-taking	(2) Media Coverage	(3) Credit-taking	(4) Media Quality
Media coverage (t-1)	-0.074***	0.602***		
Media coverage (t-2)	-0.059**	0.459***		
Media coverage (t-3)	-0.054**	0.383***		
Media coverage (t-4)	-0.079***	0.396***		
Media quality(t-1)			0.070**	0.068**
Media quality(t-2)			0.039	0.016
Media quality(t-3)			0.020	-0.008
Media quality(t-4)			0.059**	0.030
Credit-taking (t-1)	0.130***	0.072	0.103***	0.040
Credit-taking (t-2)	0.112***	0.086*	0.107***	0.075**
Credit-taking (t-3)	0.045*	0.064	0.054*	0.014
Credit-taking (t-4)	0.035	0.057	0.015	-0.002
Granger test (Prob>chi2)	10.174**	8.174*	11.454**	6.712*
Hansen's J chi2		3.343e-30***		5.317e-31***

Note: *p< 0.1; **p< 0.05; *** p<0.01. Instruments : l(1/4)

Table 5. Strength of drug cartel territorial entrenchment

Variable	Operations		No operations	
	Credit Taking	Media quality	Credit Taking	Media quality
Media quality(t-1)	0.078**	0.069	0.063*	0.068
Media quality(t-2)	0.061*	0.016	-0.002	0.016
Media quality(t-3)	0.034	-0.014	-0.011	0.005
Media quality(t-4)	0.078**	0.028	0.019	0.034
Credit-taking (t-1)	0.128***	0.042	0.022	0.036
Credit-taking (t-2)	0.103***	0.075*	0.100**	0.075
Credit-taking (t-3)	0.039	0.015	0.087	0.011
Credit-taking (t-4)	0.017	-0.002	0.010	-0.004
Granger test (Prob>chi2)	9.864**	4.624	4.422	2.292
Hansen's J chi2	3.511e-31***		1.991e-31***	

Note: *p< 0.1; **p< 0.05; *** p<0.01. Instruments : l(1/4)