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Video Games and Violent Crime

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ABSTRACT: Psychology studies of the effects of playing video games have found emotional responses and physical reactions associated with reinforced violent and anti-social attitudes. It is not clear, however, whether these markers are associated with increases in one's preferences for anti-social behaviors or whether virtual behaviors act to partially sate one's desire for actual anti-social behaviors. Violent or criminal behaviors in the virtual world and in the physical world could plausibly be either complements or substitutes. A finding of one versus the other would have diametrically opposing policy implications.

I study the incidence of criminal activity as related to a proxy for increased gaming, the number of game stores, from a panel of US counties from 1994 to 2004. With fixed county and year effects, I can examine if changes relative increases in gaming in an area are associated with relative increases or decreases in criminal activity. For six of eight categories of crime, more game stores are associated with significant declines in crime rates. Proxies for other leisure activities, sports and movie viewing, do not have a similar effect. For confirmation, I also find that mortality rates, especially mortality rates stemming from injuries, also are negatively related to the number of game stores.

Keywords: Video Games, Violence, Crime
JEL Codes: L86, D18, I18

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I. Introduction

A growing interest among policy makers is to regulate the content and marketing of video games so as to curb crime and violence, especially violence against women. The US Federal Trade Commission has made six reports to the US Congress on the broader topic of violence in media between 2000 and 2007 (FTC, 2007). As of June, 2006, there were seven bills in Congress addressing violence in video games (CNET News, 2006). So far, the US regulatory intervention has focused on placing limits on marketing to minors. Legislation aimed at video game violence is also proposed in many US states. Many broader state level restrictions have been struck down by the courts because they were found to infringe on constitutional rights (Theirer, 2006). More interventionist policies are under consideration in the EU (MacWorld, 2007), Britain (Reuters, 2007), and China (Peoples Daily Online, 2007).

The concern presupposes that violence in the video game context induces gamers into violent, criminal or anti-social behaviors outside of the gaming context. While there is evidence from psychological studies that these games heighten physical and emotional reactions related to violent, criminal, and anti-social attitudes, so far as I know, there have been no studies linking video game usage to these behaviors in gamers themselves. Economically, it is plausible that one develops a preference for actual crime or violence through simulated violent behavior. However, it is also plausible that virtual crime and virtual violence tends to sate one's demand for these activities. That is, it is impossible to tell *a priori* if video games and criminal violence are complements or substitutes. While evidence of a complementary effect might add credence

to regulation efforts, evidence of a substitution effect could undermine such support and bolster opposing policy implications.

I propose a test of this linkage, implement the test empirically, and find evidence consistent with an overall substation effect. I proxy variation in video game demand with changes in the number of game stores in an area. I employ a count data panel estimator that allows for fixed county and year effects that relates the number of crimes by category to the number of game stores. For six of eight categories of crimes, I find significant reductions in crime rates associated with more game stores. For other proxies of teen and young adult leisure activities, sporting goods stores and movie theaters, there is either no similar effect or a smaller effect. Results consistent with the crime rate findings are also obtained when mortality statistics are similarly related to proxies for gaming, sports and movie viewing.

II. Background and Theory

The psychological studies of video game violence are usually conducted within the context of more general studies of violence in media influencing behaviors, especially behaviors among the youth. Dozens of studies have investigated the influence of violence in movies and television, while fewer have examined music and, especially, video games. The literature includes studies that investigate all media, use a variety of methods and have identified multiple psychological and physical effects.

More complete surveys of the literature, and especially the policy implications, can be found in FTC (2000) and Anderson et al., (2003). The FTC summary of the research states:

> A majority of the investigations into the impact of media violence on children find that there is a high *correlation* between exposure to media violence and aggressive and at times violent behavior. In addition, a number of research efforts report that exposure to media violence is correlated with increased acceptance of violent behavior in others, as well as an exaggerated perception of the amount of violence in society. Regarding *causation*, however, the studies appear to be less conclusive. Most researchers and investigators agree that exposure to media violence alone does not cause a child to commit a violent act, and that it is not the sole, or even necessarily the most important, factor contributing to youth aggression, anti-social attitudes, and violence. Although a consensus among researchers exists regarding the empirical relationships, significant differences remain over the interpretation of these associations and their implications for public policy.

The later Anderson et al., (2003) survey suggests that, as more evidence has emerged, psychologists are more confident of a link between media violence and aggressive and anti-social attitudes in youth. However, as these authors point out, there is little information linking exposure to violence in media to violent to anti-social behaviors in a larger context.

For the link between aggressive and anti-social attitudes immediately after game play and aggressive and anti-social behaviors in a real world context, it must be the case that some gamers cannot fully disassociate game play from non-game activities. While it is clear that the majority of gamers can internalize that the rules of conduct outside of game play differ from those within the game play, it is possible that some gamers have difficulty making the distinction. Indeed, it is

possible that violent game play for many gamers sates some desire to express latent preferences for aggression and anti-social behavior. At the same time, in other gamers, violent game play in a virtual world may only "whet one's appetite" for violent actions in the real world. Which effect dominates is an empirical question.

Some studies do track the incidence of anti-social behaviors to violent or socially questionable stimuli. Dahl and DellaVigna (2007) study the incidence of violent crimes during and just after the usual showing times of violent movies. They find that violent crimes fall between 6PM and 12AM when violent movies garner large audiences. In addition, between, 12AM and 6AM, after the movie showing, violent crime falls by an even larger percentage. While the first effect is likely due to incapacitation, the latter is not. They caution that the latter effect is likely not a due only to a cathartic effect specific to violent movies, since non-violent movies that appeal to young males have the same effect.

Two studies have investigated the association of the incidence of rape to the spread of the Internet and the consequent availability of pornography (D'Amato, 2006 and Kedall, 2006). Both find evidence that availability of pornography tends to lower the incidence of rape. As the video game market has developed, a number of overall measures of anti-social behaviors, including youth violent crime rates, students carrying handguns, homicides, drug use, teens carrying guns to school, teen dropout rates, teen births, teens engaging in sex, have fallen (Theirer, 2006). Of course, overall trends may be caused by a number of factors unrelated to video games. My analysis below attempts to relate the relative incidence of criminal activity in an area to a proxy for the relative demand for gaming.

III. Empirical Model

The identification strategy I propose exploits variation in a proxy for video game usage with measures of criminal and violent behavior. Panel data for about 800 counties and eleven years allow idiosyncratic location effects to be absorbed into dummy variables for each county and year. Controlling for fixed county and year effects and other factors associated with violence, the video game proxy is related to various measures of criminal behavior and measures of violence. The key challenges of interpretation emanate from the appropriateness of the video game usage proxy, the measures associated with gamer violence and the specification of the data generating process.

An available and consistent proxy measure for the amount of video gaming for a large number of observations is the per capita number of video game stores operating in a US county in a year. While consistently measured, the number of game stores is an imperfect measure of video gaming demand. First, stores may be proportional to sales, a flow, while the incidence of violent events is related to concurrent gaming, possibly related to the stock of games owned by consumers. If the flow to stock ratio varies, this proxy loses its informative value. Because video gaming technology has improved considerably, newer games are usually preferred to the older games already in a gamer's inventory. Prieger and Hu (2006) find that the value of most games depreciates considerably in just three months. Because the value of games tend to "depreciate" quickly, the flow of video games may not be a bad proxy for the amount of gaming.

Second, areas with similar overall demand can be served with fewer large stores or more smaller stores. Among the main determinants in the size distribution of stores will be customer density and returns to store scale. Fewer larger stores with deeper inventories may experience

fewer stock outs of a specific title implying possible returns to scale. Conversely, more smaller stores imply decreased transportation costs on the part of store customers leading to increased demand. To the extent that these sorts of geographic market specific characteristics are time invariant, they could be accounted for using county fixed effects and should therefore yield unbiased estimates.

Third, the number of stores does not distinguish between demand for violent video games and demand for relatively non-violent video games. It is possible, that an increase in video gaming is related to a larger increase in non-violent game playing, with a more pacific effect, than on violent game playing, with a more inflammatory effect. The net effect could be calming and, thus, crime reducing. While such a relationship between an increase in demand for games and a decrease in the relative demand for violent content of the portfolio of games purchased is possible, it is unlikely.

Fourth, the analysis below takes variations in the number of game stores as given and does not identify the sources of changes in gaming intensity. It is difficult to imagine a valid instrumental variable; one that is related to violent gaming demand but could not affect violent behavior. It is possible that an unobserved omitted variable is affecting consumers' demand for games and also affecting potential criminals' propensities to commit a violent act directly. If so, the analysis will not identify a structural relationship between gaming and violence, but instead it would merely indicate that gaming is a coincident "marker" for changes in violent behavior.

While acknowledging the above concerns, my methodology will be to relate the incidence of crimes to the prevalence of game stores in an area at a point in time as well as other

possible contributors to criminal activity. I posit the general behavioral relationships for an individual in county *i* at time *t* of the form:

$$\Pr\left(Crime_{it}^{j}\right) = \delta_i + \delta_t + \beta_1 Youth_{it} + \beta_2 \ln\left(Income_{it}\right) + \beta_3 \ln\left(Game\,Stores_{it}\right) \quad \textbf{(1)}$$

where *j* refers to a particular class of crime. The terms δ_i and δ_t are fixed effects meant to capture idiosyncratic differences by county and year. For example, county fixed effects might include non-time varying factors such as customer distances to game stores, opportunities for crime or violence or the level of police protection. Crime and violence tends to be positively associated with youth and negatively associated with income.

It is possible that video gaming could induce violent tendencies but, because gamers spend more time gaming, they have less time to act on these tendencies. Such a diversion of attention away from criminal activity could result from increased time spent in any legitimate activity. To test for this, I allow for similar proxies of other leisure activities to also affect criminal activities. Specifically, the number of movie theaters and sporting good stores are used as proxies for time spent going to movies and time spent in sporting activities. These two measures are added to the specification to obtain:

$$\begin{aligned}\Pr\left(Crime_{it}^{j}\right) = \quad & \delta_i + \delta_t + \beta_1 Youth_{it} + \beta_2 \ln\left(Income_{it}\right) + \\ & \beta_3 \ln\left(Game\,Stores_{it}\right) + \beta_4 \ln\left(Sport\,Stores_{it}\right) + \beta_5 \ln\left(Movie\,Theaters_{it}\right)\end{aligned} \quad \textbf{(2)}$$

If the video game effect were a diversion effect or represented spurious correlation, these might also be present for these two measures of alternative leisure activities as well.

Rather than information about individuals, the available data represent aggregations of individuals to the county and year level. I assume that individuals are independent so that the

distribution of the number of crimes in category *j* follow a binomial distribution. My main estimating equation will be of the form:

$$Crimes_{it}^{j} = f\left(\delta_i + \delta_t + \beta_1 PctYouth_{it} + \beta_2 \ln\left(Income_{it}\right) + \beta_3 \ln\left(Game\,Stores_{it}\right) + \beta_4 \ln\left(Sport\,Stores_{it}\right) + \beta_5 \ln\left(Movie\,Theaters_{it}\right)\right) \quad \textbf{(3)}$$

where *f* is the Poisson distribution with each observation having exposure proportional to its population.[1] The parameter values describe effects on the logarithm of the rate at which crimes are committed at the mean of the distribution. For income and game stores, this specification assumes a constant elasticity with respect to crime rates.

There is a concern that the standard Poisson estimator will yield estimates of standard errors that are biased downward, leading one to incorrectly reject of the null hypothesis of parameter values equal to zero. A possible source of this bias can emerge from the actual distribution differing from the Poisson due to "over-dispersion." One common solution is to estimate under the assumption of a negative binomial distribution that allows for over-dispersion. This solution is problematic in this case because, a large number of counties, it is not clear that a single over-dispersion parameter describes distributional differences across counties. Likewise, attempting to estimate separate over-dispersion parameters for each county is hampered by few observations per county. Instead, I report bootstrapped standard errors from 100 repetitions. Bootstrapped standard errors will yield consistent standard errors under more general distributional assumptions.

[1]Alternative specifications regressing the logarithm of the crime rate calculated as the number of crimes per capita against fixed county and year effects the percentage who are youths, logarithm of income and logarithm of the number of game stores yield similar results.

IV. Data Description

The hypotheses described above are tested using a panel of data comprising the counties of the US for the years 1994-2004. The amount of video gaming is measured indirectly from the number of video game stores in the county as measured by the US Census Bureau's County Business Patterns data.[2] The US Census Bureau also makes annual population estimates available for each county by age category.[3] Finally, crime data come from the Federal Bureau of Investigation's (FBI's) Uniform Crime Reports, *Crime in the United States (CIUS).*[4]

County Business Patterns (CBP) data are annual data for each county in the US and include establishment, employment and payroll information for various industry classifications. For industry categories and locations with few establishments, such as specialty retail stores in less populated counties, the Census Bureau suppresses payroll and, especially, employment information for privacy reasons. The analysis below uses the number of establishments so as to maximize the number of valid observations.

Until 1997, industries were classified based on the Standard Industrial Classification (SIC) System and from 1998 based on the North American Industry Classification System (NAICS). While many industry definitions often differ between the two, the video game stores definition did not change. The NAICS code 451120 is described as "Hobby, Toy and Game Stores" which completely bridges to the SIC code 5945 with the same description. Similarly, NAICS code 451110 and SIC code 5941 are both described as "Sporting Goods Stores" and

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[2]See US Census Bureau. http://www.census.gov/epcd/cbp/view/cbpview.html.

[3]See US Census Bureau. Http://www.census.gov/popest/datasets.html.

[4]See US FBI http://www.fbi.gov/ucr/ucr.htm.

NACIS code 512131 and SIC code 7832 are both described as "Motion Picture Theaters (Except Drive-Ins)."

While the description of sporting goods stores and movie theaters seem precise, the description "Hobby, Toy and Game Stores" is broader than the measure of video game stores desired for the analysis. To better understand the composition of the CBP data I obtain data from InfoUSA on Yellow Pages listings in December 2006 for counts of establishments by county under subject headings that include "Video Games." Most of these were retailers, but a few were manufacturers and repairers. The average number of "video game" establishments across the 2,951 counties with valid data from CBP was 3.37 in 2004. The comparable average number of establishments from InfoUSA for the same counties was a somewhat lower 2.30. While the CBP measure appears to include stores other than video game stores, video game stores represent nearly three-quarters of all CBP stores. Further, the cross-sectional correlation for 2004 between the two measures was 0.95. Table 1 indicates that video game sales in the US have more than doubled over the past decade. Since hobby and other toy sales have not seen the same growth, most of the time-series variation in the CBP measure may also be due to changes in the number of video game stores. Nonetheless, the inclusion of non-video game stores in this hobby, toy and game store variable indicates that it is, at best, an imperfect measure of video game stores. While we may believe that any estimated association between this variable and crime rates emanates from the video store component, we can not rule out the hobby and toy stores component as the source.

The FBI's primary objective with the Uniform Crime Report data is to "generate to a reliable set of crime statistics for use in law enforcement administration, operation, and

management." However, partly because these data are increasingly being used by researchers studying crime, the FPI disseminates a handbook to local agencies for the uniform coding of offenses. The data report the number of crimes reported to a law enforcement agency in a county and year by type of crime. The categories of crimes available are those having to do with murder, rape, robbery, aggravated assault, burglary, larceny, motor vehicle theft, and arson.

A number of more rural counties were too small to support video game stores, sporting games stores, or movie theaters. Any many cases, CBP reports zero establishments but in many cases, the number of establishments is simply missing. To ensure that the estimation results were not a result of these smaller counties with problematic data, I constrained the sample to counties with a population of more than 50,000 and with non-missing establishment data for all years. Doing so limits the sample from over 3,100 counties to 854 counties. These remaining counties represent over 80% of the US population. Summary statistics by year for this sample are reported in table 2.

V. Results

The main regression results are reported in tables 3 and 4. The number of observations differ slightly across regressions because counties with no variation in the a particular crime rate are excluded from the sample that generates estimates for that dependent variable. Reported parameter estimates are computed from 100 iterations of bootstrapping. Coefficient estimates are virtually unchanged by bootstrapping, however estimated standard errors are somewhat larger. Overall, the specification appears to describe the data well. Wald tests reject the null hypotheses of all coefficients equal to zero at very high levels of confidence.

There are many common features of the estimated coefficients across regressions with different dependent variables. First, unreported fixed county effects are always jointly significant. This suggests the existence of unmeasured and time-invariant cross-sectional determinants of crime rates. Second, for all categories of crimes, there is evidence of a secular decline in crime rates. Since 1994 is the left out group, year dummy variables measure the change in the crime rate since 1994. Generally, these estimates are smaller the longer that time has passed and, by the end of the sample, coefficients range from -0.59 for robbery to -0.16 for rape. The declines in crime rates these estimates imply largely mirror national average trends over this time period.[5] Third, an increase in average earnings is more often associated with less crime than more crime. The coefficient for average earnings are statistically significantly different from zero (at the 5% level) for rape, burglary and arson and, in these cases, is negative. Fourth, an increase in the percent of the population that is aged 15-24 years is usually associated with increases in crime rates. This coefficient is positive for all but burglary and is significant for rape, aggravated assault, burglary, and motor vehicle theft.

The variables of particular interest are those relating to proxies for video game usage, movie theater attendance, and sporting activities. The sign of the coefficient for the natural logarithm of the number of movie theaters does not follow a consistent pattern and its magnitude never reaches the usual standards for statistical significance. The sign of the coefficient for the natural logarithm of the number of sporting goods stores is consistently negative and its magnitude approaches statistical significance for robbery. If these coefficient estimates can be considered independent of each other, a joint test of the null hypothesis that all coefficients are

[5]See <http://www.ojp.usdoj.gov/bjs/glance.htm#Crime>.

zero versus the alternative hypothesis that they are negative rejects the null at the 1% level. If the assumption from this test are valid, they support the claim that increased sporting activities such that sporting goods stores increase by 1% lead to a general decline in crime rates by an average of 0.03%. A magnitude of this size might be consistent with a diversion of attention effect in which time spent on any legitimate activity is time that a potential perpetrator is not committing a crime.

As for the proxy for video game usage, the coefficient for the natural logarithm of the number of game stores is always negative and is statistically significantly different from zero in all but two cases, those for murder and rape. The magnitudes of the significant effects range from -0.14 for arson to -0.03 for larceny. The largest reductions are for arson, robbery and motor vehicle theft, crimes associated with the teens and young adults who also tend to be the age group associated with heavier video game usage. The average magnitude across all eight crime categories is -0.08, more than twice the similar average for sporting goods. These findings are consistent with increased gaming that causes a 1% increase in game stores leading to an average 0.08% reduction in crime rates. The larger reductions relative to sporting goods and movie theaters suggest that this is not a pure diversion effect.

In an attempt to confirm the effects on crime rates, I examined the effects of gaming on mortality rates. From the Centers for Disease Control and Prevention (CDC), I obtained total mortality data by county from 1994 to 2004.[6] The mortality measures analyzed are total

[6]See <http://wonder.cdc.gov/>

mortalities, deaths of those aged 10-24, and deaths due to injury or poisoning.[7] Actual values are suppressed by the CDC when they are small enough to cause privacy concerns. This causes the sample size to be smaller for the measure corresponding to those aged 10-24. Summary statistics for these measures are reported in table 5 and results of applying the same specification, equation (3), to these measures of violent behaviors are reported in table 6. These results demonstrate largely the same pattern as those from the crime statistics. The game store effect is always negative and is statistically significant for all moralities and mortalities from injuries. The effect for those aged 10-25 is of the same magnitude as for all mortalities but the standard error is larger, possibly because the number of deaths in this group is small. As expected, the estimate of the game store effect on deaths due to injuries is even larger, though this difference in magnitudes is not significant. As with the crime statistics, the game store variable is associated with a larger reduction in mortalities than the effects associated with the movie theater or sporting goods store measures.

VI. Conclusion

One justification for policy proposals aimed at restricting youth access to violent games is that they cause a negative externality on others around them. While it is plausible to believe that youth access to violent video games induces these youths to violent or criminal behaviors, I argue that it is also plausible that it quells youth's appetite for violent or criminal behaviors. The evidence presented here is consistent with virtual violence substituting for actual violence.

[7]The cause of death from "external causes of injuries or poisonings" correspond to ICD-9 disease codes E800-E999 for years 1994 to 1998 and ICD-10 codes V01 to Y89 for years 1999 to 2004.

There are weaknesses with the analysis presented above. Chief among these is that my measure of differences in gaming intensity, changes in game stores, is an indirect proxy. It does includes non-video game stores, it does not include all avenues of video game sales, and it does not distinguish between violent and non-violent games. However, the conditions under which that this proxy measure is not correlated with violent video game play are unlikely. Stated differently, the likelihood that the measurement error in the proxy variable leads to enough of a bias so as to repeatedly generate significant negative parameters when the true parameter is positive would seem to be small.

A second weakness is that the analysis does not identify the source in the variation in video game intensity across counties. That is, exogenous variation in the key variable of interest has not been identified. It is theoretically plausible that changes in, say, funding for local after-school programs, that lead to reductions in crime rates could induce more video game play leading to more video game stores. While plausible, it is worth pointing out that most youths do not commit crimes so that those affected by such crime reducing efforts, would represent a small fraction of video gamers. The likelihood of reverse causality seems remote.

A third weakness is that it examines effects on the incidence of extreme events. There could be effects of gaming that fall short of inducing the commission of a crime or inducement of an injury serious enough to lead to a mortality. The effects on aggressive altitudes accepted in the psychological literature could have different effects on those at risk of committing these extreme events and those for whom this possibility is remote. That is, while the evidence suggests a substitution effect for these extreme events, it is possible that a complementary effect exists for the majority of social encounters.

While the goal of curbing the teen violence and crime negative externality may not justify restricting access to video games, there may be other justifications. Some parents and community members may simply find these games too offensive for children to play. If so, providing responsible adults with a simple mechanism for restricting offensive material from children. The current rating system is one such mechanism that serves this purpose without restricting access of these games to others.

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Table 1
Total US Game Software Sales

Year	Sales ($billions)	Units (millions)
1995	$3.2	
1996	$3.7	105
1997	$4.4	133
1998	$5.5	181
1999	$6.1	215
2000	$6.0	219
2001	$6.4	225
2002	$6.9	222
2003	$7.0	239
2004	$7.3	250
2005	$7.0	229

Source: The Entertainment Software Association <http://www.theesa.com/archives/2005/01/sales_genre_dat.php>

Table 2
Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Murders	7,837	19.64	67.45	0	1,678
Rapes	7,837	96.41	176.21	0	3,188
Robberies	7,837	557.54	2039.91	0	56,116
Aggravated Assaults	7,837	1031.73	3010.37	0	77,026
Burglaries	7,837	2405.59	4608.54	0	104,011
Larcenies	7,837	7764.15	13209.02	0	236,758
Motor Vehicle Thefts	7,837	1482.15	4435.07	0	113,027
Arson Events	7,837	98.16	277.33	0	6,922
Game Stores	7,837	12.59	19.05	1	307
Sporting Goods Stores	7,837	25.33	35.52	1	544
Movie Theaters	7,837	5.78	10.83	1	262
Population	7,837	292,195	518,012	47,942	9,917,331
Percent aged 15-25	7,837	14.45	3.87	7.06	40.71

Table 3
Poisson Regression Results of Crime Rates

	Murder	Rape	Robbery	Aggravated Assault
Ln Number of Game Stores	-0.036	-0.016	-0.133	-0.048
	(0.041)	(0.015)	(0.031)**	(0.022)*
Ln Number of Movie Theaters	0.066	0.018	-0.025	0.016
	(0.047)	(0.018)	(0.031)	(0.019)
Ln Number of Sporting Goods Stores	-0.015	-0.020	-0.074	-0.015
	(0.059)	(0.024)	(0.043)	(0.025)
Percent of Population Aged 15-24	0.003	0.057	0.017	0.022
	(0.015)	(0.006)**	(0.013)	(0.011)*
Ln Earnings per Capita	0.124	-0.104	0.120	0.045
	(0.189)	(0.051)*	(0.116)	(0.070)
Year 1995	-0.115	-0.059	-0.100	-0.053
	(0.032)**	(0.017)**	(0.034)**	(0.020)**
Year 1996	-0.249	-0.105	-0.194	-0.155
	(0.037)**	(0.020)**	(0.034)**	(0.023)**
Year 1997	-0.329	-0.092	-0.271	-0.151
	(0.042)**	(0.018)**	(0.041)**	(0.017)**
Year 1998	-0.418	-0.136	-0.404	-0.220
	(0.055)**	(0.019)**	(0.043)**	(0.021)**
Year 1999	-0.535	-0.204	-0.528	-0.304
	(0.061)**	(0.022)**	(0.053)**	(0.025)**
Year 2000	-0.529	-0.186	-0.533	-0.304
	(0.076)**	(0.024)**	(0.055)**	(0.027)**
Year 2001	-0.261	-0.183	-0.510	-0.322
	(0.138)	(0.028)**	(0.060)**	(0.030)**
Year 2002	-0.449	-0.137	-0.505	-0.339
	(0.083)**	(0.026)**	(0.061)**	(0.029)**
Year 2003	-0.455	-0.168	-0.551	-0.396
	(0.086)**	(0.027)**	(0.064)**	(0.032)**
Year 2004	-0.488	-0.155	-0.590	-0.408
	(0.100)**	(0.029)**	(0.069)**	(0.037)**
Observations	7,815	7,710	7,837	7,837
Counties	779	770	782	782

Bootstrapped standard errors in parentheses
* significant at 5%; ** significant at 1%

Table 4
Poisson Regression Results of Crime Rates

	Burglary	Larceny	Motor Vehicle Theft	Arson
Ln Number of Game Stores	-0.058	-0.033	-0.112	-0.140
	(0.018)**	(0.011)**	(0.031)**	(0.042)**
Ln Number of Movie Theaters	0.000	-0.001	0.028	-0.029
	(0.015)	(0.011)	(0.026)	(0.038)
Ln Number of Sporting Goods Stores	-0.020	-0.005	-0.023	-0.097
	(0.019)	(0.016)	(0.044)	(0.066)
Percent of Population Aged 15-24	-0.016	-0.002	0.042	0.029
	(0.008)*	(0.005)	(0.014)**	(0.021)
Ln Earnings per Capita	-0.122	-0.011	0.056	-0.288
	(0.049)*	(0.040)	(0.091)	(0.139)*
Year 1995	-0.070	-0.015	-0.078	-0.055
	(0.023)**	(0.013)	(0.030)*	(0.042)
Year 1996	-0.153	-0.073	-0.155	-0.122
	(0.020)**	(0.016)**	(0.033)**	(0.051)*
Year 1997	-0.146	-0.080	-0.176	-0.160
	(0.020)**	(0.014)**	(0.035)**	(0.058)**
Year 1998	-0.209	-0.150	-0.294	-0.068
	(0.023)**	(0.016)**	(0.039)**	(0.069)
Year 1999	-0.326	-0.213	-0.403	-0.292
	(0.024)**	(0.018)**	(0.046)**	(0.068)**
Year 2000	-0.349	-0.217	-0.397	-0.260
	(0.027)**	(0.018)**	(0.048)**	(0.078)**
Year 2001	-0.318	-0.203	-0.349	-0.298
	(0.027)**	(0.019)**	(0.051)**	(0.077)**
Year 2002	-0.303	-0.206	-0.324	-0.324
	(0.029)**	(0.021)**	(0.047)**	(0.082)**
Year 2003	-0.315	-0.221	-0.336	-0.416
	(0.031)**	(0.021)**	(0.055)**	(0.092)**
Year 2004	-0.326	-0.244	-0.349	-0.464
	(0.030)**	(0.022)**	(0.055)**	(0.089)**
Observations	7,837	7,837	7,837	7,822
Counties	782	782	782	778

Bootstrapped standard errors in parentheses
* significant at 5%; ** significant at 1%

Table 5
Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Mortalities	7,998	2,365.50	3,786.99	220	62,747
Mortalities aged 10-25	7,410	38.55	72.95	0	1,635
Mortalities from Injuries	7,998	151.14	255.11	13	5,212
Game Stores	7,998	12.44	18.89	1	307
Sporting Goods Stores	7,998	25.01	35.24	1	544
Movie Theaters	7,998	5.72	10.73	1	262
Population	7,998	288,599	513,443	47,942	9,917,331
Percent aged 15-25	7,998	14.50	3.97	7.06	40.71

Table 6
Poisson Regression Results of Mortality Rates

	All Mortalities	Mortalities Aged 10-25	Mortalities from Injuries
Ln Number of Game Stores	-0.014	-0.015	-0.023
	(0.004)**	(0.012)	(0.008)**
Ln Number of Movie Theaters	-0.001	-0.005	-0.009
	(0.003)	(0.011)	(0.009)
Ln Number of Sporting Goods Stores	-0.011	-0.009	0.001
	(0.004)*	(0.015)	(0.009)
Percent of Population Aged 15-24	0.009	0.029	0.014
	(0.002)**	(0.006)**	(0.004)**
Ln Earnings per Capita	-0.028	0.141	-0.019
	(0.016)	(0.047)**	(0.032)
Year 1995	0.006	-0.045	-0.017
	(0.006)	(0.016)**	(0.014)
Year 1996	0.000	-0.126	-0.031
	(0.006)	(0.015)**	(0.014)*
Year 1997	-0.012	-0.175	-0.051
	(0.005)*	(0.017)**	(0.013)**
Year 1998	-0.012	-0.235	-0.057
	(0.006)*	(0.018)**	(0.015)**
Year 1999	0.001	-0.259	-0.064
	(0.006)	(0.021)**	(0.015)**
Year 2000	-0.001	-0.250	-0.077
	(0.007)	(0.022)**	(0.018)**
Year 2001	-0.004	-0.234	-0.043
	(0.007)	(0.022)**	(0.020)*
Year 2002	-0.003	-0.229	-0.008
	(0.008)	(0.023)**	(0.018)
Year 2003	-0.014	-0.229	-0.009
	(0.008)	(0.023)**	(0.019)
Year 2004	-0.042	-0.252	0.002
	(0.008)**	(0.027)**	(0.021)
Observations	7,998	7,401	7,998
Counties	800	790	800
Bootstrapped standard errors in parentheses			
* significant at 5%; ** significant at 1%			