Education: The Secret to Crime Reduction?

Abstract

The battle for crime control is a constant one. Researchers from various branches – sociology, political science, and economics – have attempted to assess the root of crime from different angles only to find hotly contested results. Most research, however, is centered on country-by-country analyses. This paper differs largely by taking theoretical concepts usually applied in specific cases and applying them on a cross-national level using a panel analysis and country fixed effects. Specifically, focusing on college graduation and varying levels of educational attainment, I test the extent to which education reduces crime. Results show that increased college graduation rates corresponds to a significant decrease in the crime rate. A 5% increase in the college graduation rate, for instance, produces an 18.7% reduction in the homicide rate. Higher youth unemployment levels, contrary to common belief, are also shown to decrease crime rates. Finally, I compare the effects of education between developed and developing countries and show that graduation rates become insignificant when the data are segmented by economic development. This study can prove useful for nation leaders and policymakers searching for ways to constructively increase the physical safety of its citizenry. The results can add to available information in a way that allows for future improved education and criminal justice policies.

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1. Introduction

There is no existing nation that does not struggle with crime. It is a social ill that has been studied across disciplines while simultaneously plaguing societies and their people. With the assumption that complete eradication of crime is not feasible, theorists have instead focused their attention on studying ways in which the prevalence of criminal activity can reach its minimum limit. Questions concerning the causes of crime and their prevention have resulted in a vast array of mechanisms for the purpose of crime control and correction. Some nations, like the United States, have chosen to implement mandatory sentencing laws with hopes of deterring crime and holding offenders responsible for their actions. Others have chosen to increase police vigilance via larger police forces and sophisticated surveillance technologies.

In this paper, I study education as an ex ante crime reducing mechanism. Specifically, I investigate whether increases in education levels correspond with crime reduction. Extensive research has been done on the benefits of education for reducing the crime rate with positive results. Since there is a pervasive issue of mass incarceration in the United States, the literature is heavily concentrated on crime in the U.S. This paper differs in its use of a panel analysis approach, which looks at crime across years and nations including both those that are developed and those that are developing.

The intersection of education and crime is highly relevant to the creation of effective crime deterring polices. This project is valuable in that it would provide a measure of the effectiveness of educational attainment as a mechanism for crime prevention and so crime control. The results can have notable policy implications for both education and corrections. The ability to decrease crime through higher educational attainment would not only decrease social costs (i.e. violence and large sums of working age people in prisons), but it could also potentially

be economically efficient since less would need to be spent on corrections. Corrections costs include time spent on police work and court proceedings and the cost of maintaining the criminal in prison, if they are incarcerated. In the United States in particular, keeping an individual imprisoned for a year "can cost more than a year at Harvard" (Bowling, Julian, et al., 2015). It goes without saying, then, that deterring potential offenders can have important economic gains.

This study focuses on crimes most concerning for the direct, physical well being of a country's citizens – violent crimes. Intentional homicide rates were used as a proxy for violent crime because of the heavy availability of data on this measure as compared to other violent crimes. They were also used to curve the issue of underreporting that plagues crime data since they suffer the least from underreporting.

The results show that obtaining a college degree does decrease the homicide rate across countries, though minimally. Specifically, higher college graduation rates of males have a stronger effect on crime reduction in contrast to that of female graduates. A comparison of the effects of increased secondary graduation rates to that of college graduation rates shows that there is also a trend of significant, increased reductions in crime as higher levels of education are achieved. Moreover, the significance of college graduation rates disappears when focusing on the set of developed or developing countries. GDP per capita, however, retains some significance along with the youth unemployment rate. Higher youth unemployment, then, correlates with a decrease in the homicide rate – a result that is contrary to the belief that high unemployment leads to spikes in crime. Based on the continued significance of economic factors like GDP per capita and youth unemployment, the overall results suggest that education has value as a crime reducing mechanism but the strength of its effect depends on the economic environment in which it functions.

2. Theoretical Framework

2.1 Literature Review

Recent years have brought about deeper and more extensive research on the relationship between crime and education. Specifically, work has been done to test the effectiveness of education as a crime reducing agent. Lochner and Moretti (2004) have provided strong support for the theory that increased high school graduation rates in the United States do correspond to significant reductions in the crime rate. Machin, Marie, and Vujić (2011) found further supporting evidence showing that increased educational attainment reduces property crime and produces large social benefits over time.

After consistent results across studies and disciplines, the literature has come to accept a few assumptions about the nature of crime itself. Offenses tend to be committed more by males than females, creating a disparity among the sexes. Younger rather than older persons are also more likely to commit crimes. Kirstine Hansen (2003) in particular has analyzed "crime-age" profiles showing that the age component is a consequence of environmental variables like schooling experienced by individuals during their earlier years. Based on these past findings on sex and age, this study also assumes the results supported by the literature to be true so that males and younger persons are assumed to be the most likely offenders.

Though previous work has seen promising and exciting results, the work has been done on a country-by-country basis. Most of the research has been conducted on the United States along with other nations like England (Machin, Marie, and Vujić, 2011), the Netherlands (Groot and van den Brink, 2010), and Italy (Buonanno and Leonida, 2006). Buonanno and Leonida's (2006) research on Italy is especially interesting because of its attention to the effect of education on crime on a regional basis. Likewise, Hansen's (2003) research on the effect of compulsory

attendance laws in England and Wales is of note for its measurement of the effectiveness of an instituted policy. However, this study takes those advancements and pushes them further to test their applicability across a wide range of countries. As stated by Fajnzylber, Lederman, and Loayza (2002), the issue with studying crime on a cross-national basis is the limited amount of available data. Thus, this study will tend to feature relatively low observation numbers.

In addition to focusing on specific nations, research has largely focused on secondary education – high school dropouts and high school graduates have particularly been examined. The Alliance for Excellent Education (2013) has found that a 10% increase in the male high school graduation rate would lead to an estimated 20% decrease in assault and murder arrest rates. Also of note is their prediction that even a 5% increase in male high school graduation rates would result in an estimated $19.7 billion savings in corrections costs (The Alliance for Excellent Education, 2013). Lochner and Moretti (2004) have also addressed the effects of secondary education on crime rates through a mostly economic, cost analysis lens. Their study has shown that increased high school graduation rates do produce a significant decrease in crime rates and are economically efficient in reducing corrections costs (Lochner and Moretti, 2004). Though high school graduation has shown a significant influence on crime rates, the work of others like Lochner and Moretti raises the question of the impact of college graduation rates.

This study diverges from the larger literature by testing country-based theories on a larger nation scale and conducting analyses on developing countries instead of honing in on developed, Western nations. Promising social and economic savings suggested by earlier works have given strong support for the use of education as an efficient crime reduction tool in developed nations. In their study on the Netherlands, for instance, Groot and van den Brink (2010) found that a one-year increase in the average education level of the population would result in a sizeable net

savings of €578 million. Considering the large savings produced in developed nations, it is worth studying the possible savings in developing economies that start out with significantly less money to distribute.

2.2 Theory

The underlying theory of this project has its foundation on the theory applied to the United States by Lochner and Moretti (2004). Their theory, based on opportunity costs, expects that an increase in educational attainment will decrease the rate of violent crime through its influence on wages. The correlation between educational attainment and wages is largely supported by the literature. For instance, in a study by The College Board (2013), female college graduates were shown to earn $19,100 more, on average, than their high school graduate counterparts. Likewise, male college graduates earned an average of $25,800 more than male high school graduates (The College Board, 2013). Income has also shown to vary by gender with males at a given education level earning more, on average, than females at the same level (The College Board, 2013).

Based on the link between educational attainment and wages, Lochner and Moretti (2004) expect an increase in income to increase the opportunity cost of illicit activity. The opportunity cost rises because one faces the risk of jail time and lost time while committing crimes when money could be earned through legitimate work.[1] As one's income grows, the time lost from committing crime increases in cost because time is worth more. This decreases one's likelihood of committing a violent act because one does not want to take the increased risk of losing more than one would gain.

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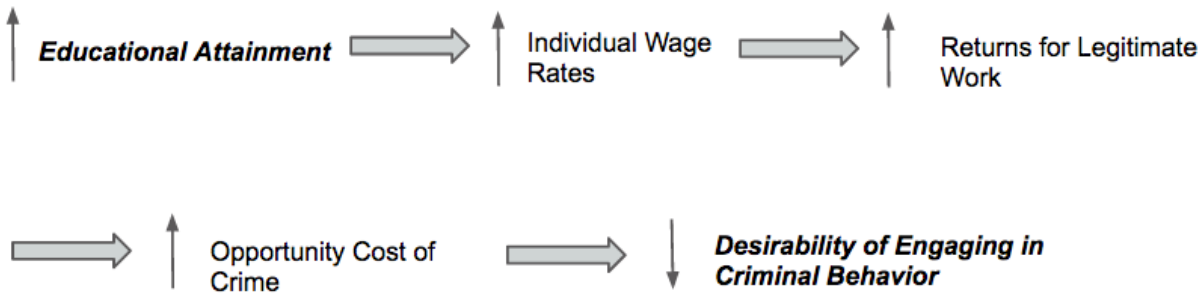
[1] Income should, then, have a higher impact on violent versus nonviolent crime because violent crime presents a higher risk (the difference between facing fines that can be easily paid for in the case of nonviolent crimes and facing 10 or more years in jail).

The assumption made is that higher levels of educational attainment, such as college degrees, will perpetuate the above-mentioned theoretical pattern. Higher education will increase one's wage, deterring offenses. Those same higher wages can later increase educational attainment, as wealthier persons are more likely to attend college.[2] Therefore, each causal factor in this theoretical pattern should result in its given effect (higher educational attainment should lead to an increase in income and so on). The theory also assumes that higher education can deter violent crime while allowing for an increase in nonviolent crime – the total crime does not have to decrease.

Figure 1. Theory of Crime Reduction
Income is shown as the mechanism through which educational attainment decreases crime.



Based on the above theory, the following are my hypotheses:

H_1: Increase in college graduation rates will decrease rate of violent crime

H_2: Increase in college graduation rates of young males will decrease rate of violent crime

H_3: Female college graduation rates will have no effect on the rate of violent crime as opposed to male college graduation rates

[2] Those attending are expected to be the children of wealthier or higher educated persons because income is related to college attendance (Desilver 2014).

H_4: Violent crime rates will progressively decrease more significantly as higher levels of educational attainment are obtained

H_5: Violent crime rates will progressively decrease more significantly as males obtain higher levels of educational attainment while higher educational attainment of females will have no effect

H_6: Increased college graduation rates will significantly decrease the rate of violent crime in both developed and developing countries with developing countries seeing a larger impact.

3. Methodology

To test my hypotheses, I conducted a panel analysis across countries and time for the years 1998 to 2012 for both secondary and college graduation rates. A time lag was included to allow for education to have an impact, as it does not necessarily make a difference at the exact point of graduation. I also used country fixed effects to control for systemic differences in what constitutes crime between nations and clustered the standard error terms by country. The significance of the relationships was used to compare and contrast the effects of secondary and college graduation on the rate of violent crime. Special attention was given to the results for college graduation rates to assess whether my hypotheses were rejected or failed to be rejected.

The following standard model was used throughout this study with variations being noted throughout the analyses according to the hypothesis being tested[3]:

$$\textbf{Intentional Homicide Rate}_{i,t} = \beta_0 + \beta_1(\textbf{College Graduation Measure}) + \beta_2(\textbf{Youth Unemployment Measure})^4 + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

[3] Models were tested using OLS regressions.

[4] The youth unemployment rate is segmented by sex in the model whenever the college graduation rate is as well. For example, if the male college graduation rate is being used, the male youth unemployment rate is also used. This was done to assure the unemployment measure corresponded to the population of graduates being examined. The male and female graduation and youth unemployment measures are never included in the same model as the two are 87% correlated.

4. Data and Data Sources

4.1 Dependent Variable: Intentional Homicide Rate[5]

As a result of limited cross-national crime datasets, the intentional homicide rate was used as a proxy for violent crime. Intentional homicides are more widely compiled across countries than other subsets of violent crime and so provide more information for the purposes of this study.[6]

The data on intentional homicides was obtained from the World Bank's World Development Indicators database. The original source of the data is the UN Office on Drugs and Crime's International Homicides Statistics database. Data used in this project is provided for a time span of 15 years from 1998 to 2012 for 204 countries. The homicide rate itself is measured as a function of homicides per 100,000 people.[7] The intentional homicide measure does not include all categories of intentional killing. For a list of killings included in the homicide measure, see Appendix A.

4.2 Independent Variables: College Graduation Rate, Youth Unemployment Rate, & Economic Development Level

4.2a | Graduation Rate

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[5] The terms murder and homicide will be used interchangeably throughout this paper in reference to the intentional homicide rate. Intentional homicides will also be the only dependent variable throughout the analyses unless stated otherwise.

[6] Crime rates are known to suffer from underreporting by governments. Intentional homicides, however, are the least affected by underreporting because the police usually must account for bodies (Fajnzylber, Lederman, and Loayza 2002). Intentional homicides are selected as the primary measure of crime in this study in an attempt to curve the underreporting issue.

[7] The World Bank, and so the UN, defines intentional homicides as "estimates of unlawful homicides purposely inflicted as a result of domestic disputes, interpersonal violence, violent conflicts over land resources, intergang violence over turf or control, and predatory violence and killing by armed groups."

All of the data for the independent variables were collected from the World Bank's World Development Indicators database. Each variable has data available for a span of 15 years from 1998-2012. The college graduation rate dataset contains information for 241 countries.[8] Sex stratified data was also collected so that information is available for both female and male graduates separately. The secondary graduation rate dataset, also from the World Development Indicators database, was compiled and stratified in the same manner. Thus, data is available by education level and sex.

4.2b | Youth Unemployment Rate

Though other measures of unemployment exist, this paper focuses on the youth unemployment rate.[9] The two levels of education observed – secondary and tertiary schooling – typically draw students from a younger age group. The youth unemployment rate, originally provided by the International Labour Organization (ILO), specifically focuses on that younger age group and is thus more useful in this case. Data was collected for 214 countries and is measured as "the share of the labor force ages 15-24 without work but available for and seeking employment." Like the college graduation rate variable, youth unemployment data was also collected by sex. Therefore, youth unemployment rates are included by male and female youth unemployment as well as the combined rate. Stratifying the variables by sex will allow for the testing of hypotheses related to a specific sex.

4.2c | Level of Economic Development

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[8] The World Bank measures the college graduation rate as the "total number of graduates in tertiary [first degree programs] expressed as a percentage of the total population of the age where they theoretically finish the most common first degree program in the given country."

[9] The reason for using the youth unemployment rate comes from the assumption, stated earlier, that younger populations are more likely to commit crimes than older populations.

For the purpose of classification, the level of economic development of a nation was defined according to the Word Bank's categories. The data was collected from the World Bank's Country and Lending Groups dataset, which contains economy classifications for 214 countries. Countries are classified on a range from low-income to high-income according to 2013 gross national income per capita.

Development appears in this paper as a dummy variable. Developed countries, classified by the World Bank as high-income, were given a value of 0. Developing countries, defined by the World Bank as middle-income and low-income economies, were given a value of 1.[10] As such, development here will serve as a relative measurement of economic development. It is not meant as a description of a country's overall development status.

4.3 Control Variables[11]

- Population density
- Log of Total Population
- Log of GDP per Capita
- Polity Score

5. Results

5.1 Effects of College Graduation Rates (H_1)

H_1: Increase in college graduation rates will decrease rate of violent crime

[10] The income classifications were based on 2013 gross national income (GNI) per capita which the World Bank calculated using the World Bank Atlas method. The following are the income limits of each classified economy: low-income economies are those with a GNI per capita of $1,045 or less, lower middle-income economies have a GNI per capita between $1,046 and $4,125, upper middle-income economies are between $4,126 and $12,746, and high-income economies have a GNI per capita of $12,746 or greater.

[11] See Appendix A for details

Model 1: College Graduation Rate and Youth Unemployment Rate

$$\textbf{Intentional Homicide Rate}_{i,t} = \beta_0 + \beta_1(\textbf{College Graduation Rate}) + \beta_2(\textbf{Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Model 2: College Graduation Rate (Lagged 1 Year) and Youth Unemployment Rate

$$\textbf{Intentional Homicide Rate}_{i,t} = \beta_0 + \beta_1(\textbf{College Graduation Rate, L(1)}) + \beta_2(\textbf{Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Model 3: College Graduation Rate and Youth Unemployment Rate (Lagged 1 Year)

$$\textbf{Intentional Homicide Rate}_{i,t} = \beta_0 + \beta_1(\textbf{College Graduation Rate}) + \beta_2(\textbf{Youth Unemployment Rate, L(1)}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Table 1. College Graduation Rate and Intentional Homicide Rate

	Model 1		Model 2		Model 3	
College Graduation Ratio	-0.0329*	(0.0164)	-0.0109	(0.0141)	-0.0355*	(0.0165)
Youth Unemployment Rate	-0.0330	(0.0207)	-0.0358*	(0.0161)	-0.00922	(0.0300)
Population Density	-0.0144	(0.0179)	-0.0180	(0.0267)	-0.0145	(0.0186)
Log of Total Population	18.05	(9.997)	13.87*	(5.867)	18.26	(10.42)
Log of GDP per Capita	-3.015**	(1.105)	-3.323*	(1.347)	-3.006**	(1.118)
Polity 2	-0.0208	(0.121)	0.157	(0.0860)	-0.0175	(0.119)
College Graduation Ratio, Lagged 1 Year			-0.0180	(0.0141)		
Youth Unemployment Rate, Lagged 1 Year					-0.0370	(0.0289)
Constant	-256.5	(163.3)	-186.9	(96.21)	-259.4	(170.0)
Observations	660		541		651	

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

College graduation rates are seen to have a significant negative impact on homicides in each of the above cases but one. When the college graduation ratio is lagged by even one year, its impact is still negative but its significance is lost. However, the significance returns when youth unemployment is lagged instead. The results, thus, show that H_1 in this case fails to be rejected – increases in college graduation rates do correspond with a decrease in the murder rate. Though the decrease may appear to be small, even a 1-percentage point increase in the college graduation rate correlates to a 3.74 decrease in the homicide rate.

The flip flop in the significance of the graduation rate when either the graduation rate measure or youth unemployment rate are lagged shows that lagging is not an essential or useful component of a model of crime reduction. It was expected that lagging the college graduation variable would show a significant drop in the intentional homicide rate. The assumption behind the expectation was that the decision to commit a crime does not come directly after graduating from a college or university. Rather, new graduates have initial expectations of employment after graduating and spend time looking for jobs. However, after longer periods of joblessness, the likelihood of graduates looking for alternative forms of income would then increase (Malby, Steven, et al., 2012). The inconsistent results produced from lagging the college graduation rate versus the youth unemployment rate, though, makes the importance of the time aspect in this model questionable. Instead, it appears that the youth unemployment rate matters in the year of graduation and not necessarily after the fact.[12] Thus, the testing of further hypotheses in this study will use the standard, non-lagged model.

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[12] Higher college graduation rates could have the inverse effect of increasing the murder rate if the youth unemployment rate is high and there are little jobs for graduates. Likewise, higher graduation rates could decrease the murder rate if the youth unemployment rate is low and graduates are able to obtain employment.

It is also important to note that the log of GDP per capita is consistently significant across all of the above regressions. A 1% increase in the GDP per capita correlates to an approximate 4.26% decrease in the homicide rate. So, wealthier countries are shown to have lower murder rates overall. The result is expected, as wealthier countries are able to contribute more funding for corrections and policing.

5.2 Effects of Male College Graduation Rates (H_2)

H_2: Increase in college graduation rates of young males will decrease rate of violent crime

Model 1: Male College Graduation Rate and Male Youth Unemployment Rate

$$\textbf{Intentional Homicide Rate}_{i,t} = \beta_0 + \beta_1(\textbf{Male College Graduation Rate}) + \beta_2(\textbf{Male Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Table 2. Male College Graduation Rate and Intentional Homicide Rate

	Model 1	
Male College Graduation Rate	-0.0416*	(0.0209)
Male Youth Unemployment Rate	-0.0397*	(0.0165)
Population Density	-0.0166	(0.0191)
Log of Total Population	18.74	(10.26)
Log of GDP per Capita	-3.284**	(1.108)
Polity 2	0.00960	(0.150)
N	634	

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

As per the theory, male college graduates are expected to have a larger impact on crime reduction. They are also predicted to have a more significant influence compared to female college graduates because young males are more likely to be the offenders. H_2 is used to test the theory that a higher rate of male college graduates will reduce the murder rate.

Concentrating on male college graduation rates shows similar results to those of the tests for H_1 in which the general college graduation rate was used. An increase in the male college graduation rate does decrease the murder rate and so H_2 fails to be rejected. Like general college graduation rates, the reduction may appear small but still has value as a 1% increase in the male college graduation rate corresponds to a 3.28% decrease in the homicide rate.

The log of GDP per capita, once again, is also significant. The amount of change it produces is about the same in this model as in the model used to test the first hypothesis. That is to say that a 1% increase in the GDP per capita correlates to an approximate 4% decrease in the homicide rate. The results from both the tests for H_1 and H_2 , thus, further support the claim that wealthier countries tend to have lower murder rates.

5.3 Effects of College Graduation Rates By Sex (H_3)

H_3: Female college graduation rates will have no effect on the rate of violent crime as opposed to male college graduation rates

Model 1: Female College Graduation Rate and Female Youth Unemployment Rate

$$\textbf{Intentional Homicide Rate}_{i,t} = \beta_0 + \beta_1(\textbf{Female College Graduation Rate}) + \beta_2(\textbf{Female Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Table 3. Female College Graduation Rate and Intentional Homicide Rate

	Model 1	
Female College Graduation Ratio	-0.0216	(0.0133)
Female Youth Unemployment Rate	-0.0124	(0.0300)
Population Density	-0.0170	(0.0195)
Log of Total Population	17.89	(10.40)
Log of GDP per Capita	-2.785*	(1.197)
Polity 2	0.0124	(0.150)
Constant	-255.6	(169.6)
Observations	634	

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

H_3 tests the theory that male graduates as opposed to female graduates will have a stronger impact on the murder rate because male youth are more likely to be the offenders. In the above analysis, female college graduation rates were isolated to test their impact and female youth unemployment was used as the unemployment measure. The results support the hypothesis that female college graduation rates have no significant effect on the murder rate. These results are important considering male college graduation rates were found to correspond with a significant reduction in the homicide rate while testing H_2. Thus, looking at the results of H_2 and H_3 in conjunction supports the claim that even though the overall college graduation rate is significant in reducing the homicide rate, it is the male population that is driving that effect, not the female population. [13]

5.4 Effects of Higher Educational Attainment (H_4)

H_4: Violent crime rates will progressively decrease more significantly as higher levels of educational attainment are obtained

[13] Also of note, the log of GDP per capita continues to be a significant factor in crime reduction.

Model 1: Secondary Graduation Ratio and Youth Unemployment Rate

$$\textbf{Intentional Homicide Rate}_{i,t} = \beta_0 + \beta_1(\textbf{Secondary Graduation Rate}) + \beta_2(\textbf{Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Table 4: Secondary Graduation Rate and Intentional Homicide Rate

	Model 1	
Secondary Graduation Ratio	0.0168	(0.0414)
Youth Unemployment Rate	0.0543	(0.115)
Population Density	-0.0935	(0.144)
Log of Total Population	37.67	(23.04)
Log of GDP per Capita	-5.771*	(2.728)
Polity 2	-0.0830	(0.153)
Constant	-549.5	(360.5)
Observations	212	

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Part of the theory of this project is that if everything holds true, increases in educational attainment will correlate with significant crime reduction. To test H_3, then, it is pertinent to not look at these results on their own but in comparison with those of H_1.[14] In so doing, one is able to assess whether the argument for educational attainment is sound.

Though the results for the model above using secondary graduation rates finds graduation rates insignificant, they do add support to H_3. Graduation rates become significant as higher levels of education are achieved. Going from secondary to tertiary, the graduation rates jump from being insignificant with a positive coefficient (0.0167) to significant with a negative

[14] The results for H_3 are compared to H_1 because both use the overall measure of the graduation rate (secondary and college graduation rate, respectively) and youth unemployment rate as opposed to the measures segmented by sex. Comparing the two sets of results also shows the trend in crime reduction from a one education level (secondary degree) to another (college degree).

coefficient (-0.0329). Thus, there is some supporting evidence for the theory that increasing levels of educational attainment produce increasing, significant reductions in the murder rate.

5.5 Effects of Higher Educational Attainment By Sex (H_5)

H_5: Violent crime rates will progressively decrease more significantly as males obtain higher levels of educational attainment while higher educational attainment of females will have no effect

Model 1: Male Secondary Graduation Rate and Male Youth Unemployment Rate

$$\textbf{Intentional Homicide Rate}_{i,t} = \beta_0 + \beta_1(\textbf{Male Secondary Graduation Rate}) + \beta_2(\textbf{Male Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Model 2: Female Secondary Graduation Rate and Female Youth Unemployment Rate

$$\textbf{Intentional Homicide Rate}_{i,t} = \beta_0 + \beta_1(\textbf{Female Secondary Graduation Rate}) + \beta_2(\textbf{Female Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Table 5: Male and Female Graduation Rates and Intentional Homicide Rate

	Model 1		Model 2	
Male Secondary Graduation Ratio	0.0154	(0.0365)		
Male Youth Unemployment	0.0268	(0.0928)		
Population Density	-0.0986	(0.147)	-0.0909	(0.144)
Log of Total Population	39.18	(24.70)	36.41	(21.82)
Log of GDP per Capita	-6.117*	(2.821)	-5.467*	(2.693)
Polity 2	-0.0839	(0.156)	-0.0839	(0.153)
Female Secondary Graduation Ratio			0.0112	(0.0358)
Female Youth Unemployment			0.0657	(0.116)
Constant	-569.2	(385.2)	-530.4	(340.8)
Observations	208		208	

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

If increased educational attainment is shown to significantly decrease the murder rate, the same is hypothesized to occur when isolating the effects of male secondary graduation rates. Since females are less likely to be the offenders, it is expected that the increase in their education level from secondary to college will have no significant effect on the homicide rate. H_5 tests that theory by investigating the effects of both male secondary graduation rates and female secondary graduation rates on the homicide rate. As in the test for H_4, secondary graduation rates, regardless of sex, do not have significant impacts on the homicide rate. Thus, looking at the trend from secondary to college graduation rates by sex, H_5 fails to be rejected. When segmenting the data by sex, increased educational attainment does result in a significant decrease in the homicide rate in the case of male college graduates but not in that of female college graduates. This result further supports the theory of increased crime reduction as a consequence of higher educational gains.

5.6 Effects of College Graduation Rates By Level of Development (H_6)

H_6: Increased college graduation rates will significantly decrease the rate of violent crime rate in both developed and developing countries with developing countries seeing a larger impact

Developing Countries[15]

Model 1: College Graduation Rate and Youth Unemployment Rate

$$\textbf{Intentional Homicide Rate}_{i,t} = \beta_0 + \beta_1(\textbf{College Graduation Rate}) + \beta_2(\textbf{Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

[15] All models will feature i = the subset of developing countries in the dataset.

Model 2: Male College Graduation Rate and Male Youth Unemployment Rate

$$\textbf{Intentional Homicide Rate}_{i,t} = \beta_0 + \beta_1(\textbf{Male College Graduation Rate}) + \beta_2(\textbf{Male Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Model 3: Female College Graduation Rate and Female Youth Unemployment Rate

$$\textbf{Intentional Homicide Rate}_{i,t} = \beta_0 + \beta_1(\textbf{Female College Graduation Rate}) + \beta_2(\textbf{Female Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Table 6: College Graduation Rate and Intentional Homicide Rate (Developing Countries)

	Model 1		Model 2		Model 3	
College Graduation Rate	-0.0638	(0.0475)				
Youth Unemployment Rate	0.0394	(0.0768)				
Male College Graduation Rate			-0.102	(0.0554)		
Male Youth Unemployment Rate			0.0498	(0.0759)		
Female College Graduation Rate					-0.0239	(0.0377)
Female Youth Unemployment Rate					0.0414	(0.0831)
Population Density	-0.00587	(0.0517)	0.0960	(0.194)	0.0874	(0.193)
Log of Total Population	38.11	(26.15)	33.54	(34.08)	33.01	(34.53)
Log of GDP per Capita	-3.440	(1.765)	-3.469	(1.985)	-4.393*	(2.151)
Polity 2	-0.0451	(0.134)	-0.0137	(0.164)	-0.0195	(0.164)
N	253		235		235	

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

To test H_6, two separate analyses were done on the impact of college graduation rates – one for developing countries and one for developed countries. The same standard regression model was tested on both sets of countries to see if the findings for H_1 – H_3 are applicable under both developed and developing conditions. That is to say that H_5 tests whether college

graduation rates will significantly decrease the murder rate in developed and developing countries.

The three regression analyses above consistently show that college graduation rates do not significantly decrease the homicide rate in the case of developing countries. Unlike the results found in the tests of $H_1 - H_3$, the significance is also not stratified by sex. The graduation of males is not more significant than that of females, which contradicts the theory that male graduates have a larger impact since they are more likely to be the offenders. This may be because of the general insignificance of college graduation rates in this set of countries.

One important aspect of the results worth noting in this case is the observation number of each regression model. In looking at the results, the observation number is significantly smaller in each case compared to the observation number of previous regression analyses in this paper. With that said, the above results will remain as general insights into the impact of college graduation until more data is available across developing countries. The lower number could possibly be attributed to reporting issues, particularly of intentional homicide rates.

Developed Countries[16]

Model 4: College Graduation Rate and Youth Unemployment Rate

$$\textbf{Intentional Homicide Rate}_{i,t} = \beta_0 + \beta_1(\textbf{College Graduation Rate}) + \beta_2(\textbf{Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

[16] All models will feature i = the subset of developed countries in the dataset.

Model 5: Male College Graduation Rate and Male Youth Unemployment Rate

$$\textbf{Intentional Homicide Rate}_{i,t} = \beta_0 + \beta_1(\textbf{Male College Graduation Rate}) + \beta_2(\textbf{Male Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Model 6: Female College Graduation Rate and Female Youth Unemployment Rate

$$\textbf{Intentional Homicide Rate}_{i,t} = \beta_0 + \beta_1(\textbf{Female College Graduation Rate}) + \beta_2(\textbf{Female Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Table 7: College Graduation Rate and Intentional Homicide Rate (Developed Countries)

	Model 4		Model 5		Model 6	
College Graduation Rate	0.00765	(0.0123)				
Youth Unemployment Rate	-0.0484***	(0.0121)				
Male College Graduation Rate			0.0149	(0.0132)		
Male Youth Unemployment Rate			-0.0479***	(0.0122)		
Female College Graduation Rate					0.00641	(0.00989
Female Youth Unemployment Rate					-0.0379***	(0.0104
Population Density	-0.00869	(0.00524)	-0.00866	(0.00549)	-0.00966	(0.00566
Log of Total PopulationPopTotal	6.499**	(2.060)	6.371**	(2.086)	6.121**	(2.254)
Log of GDP per Capita	-5.216**	(1.647)	-5.143**	(1.480)	-5.010**	(1.763)
Polity 2	-0.00767	(0.0697)	-0.0149	(0.0582)	0.0259	(0.0681
N	407		399		399	

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

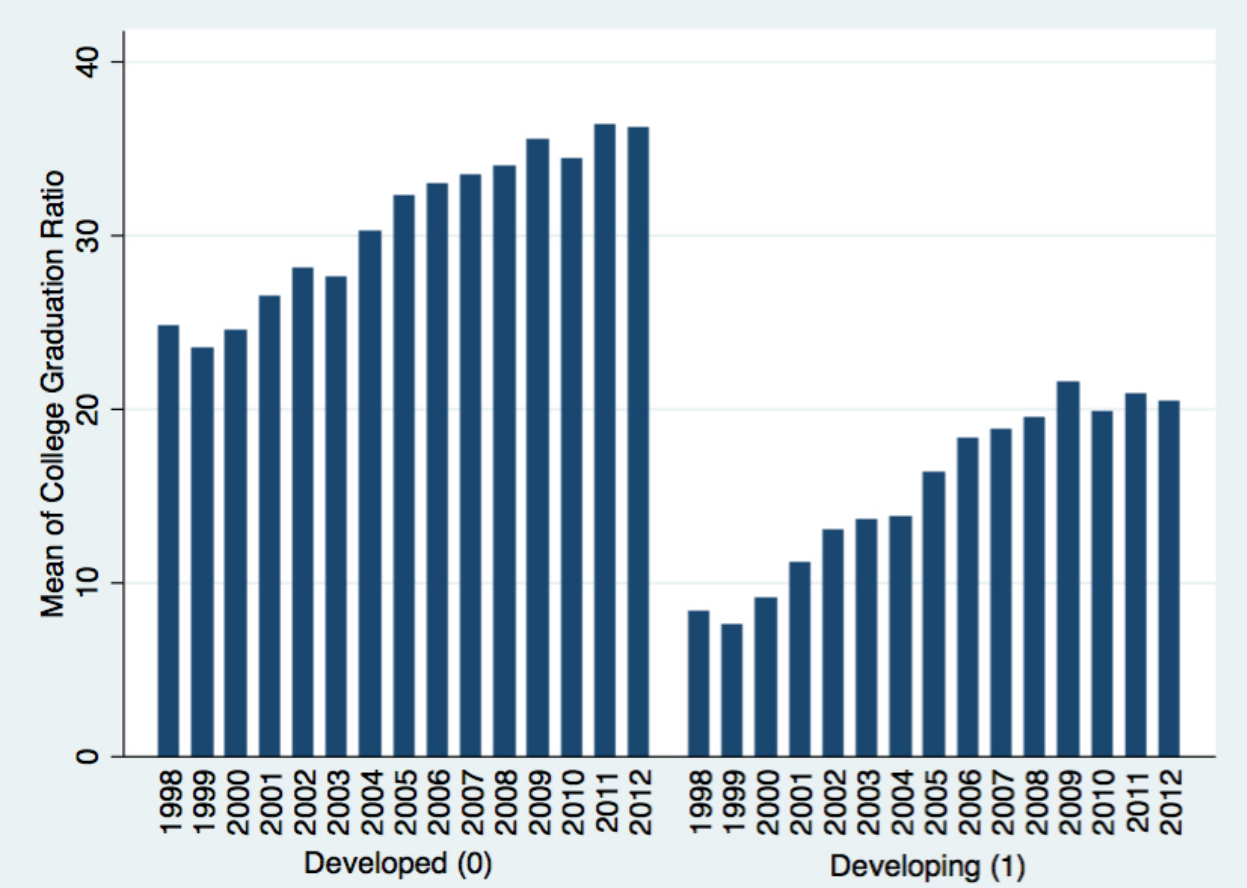
Upon first glance of the results for developed countries, one quickly notices that college graduation rates are again not significant in any case. What does become significant is the log of GDP per capita. A 1% increase in the logged GDP per capita in this case decreases the homicide rate by 5.2%. The results apply even when stratified by the sex of the graduates. Contrary to

developing countries, then, GDP per capita corresponds to a significant, reductive impact on murder rates in developed countries.

Youth unemployment remained consistent as a significant factor in homicide rate reduction across Models 4-6. While consistent in significance, it was also steady in its coefficient in terms of direction. The coefficient was negative across all of the analyses meaning a 1% increase in the youth unemployment rate correlates to a 2.22% decrease in the homicide rate. This finding is contrary to the popular belief that higher unemployment leads to higher crime rates which is not the case here. The role of unemployment will be discussed further in a later section.

Based on the two separate analyses of developed and developing countries, H_6 is not sustained. College graduation rates hold no significance on homicide rates in both developed and developing countries as hypothesized. Instead, GDP per capita is seen as the significant contributor to homicide rate reduction but only in the case of developed economies. College graduation rates being insignificant for homicide reduction in developed nations is likely due to the high graduation rates of those nations. The figure below shows that developed countries, on average, have notably higher college graduation rates compared to developing countries. Thus, an increase in the graduation rate in developed countries will likely have a smaller impact because it is closer to the full rate of 1 than developing countries.

Figure 2: Average College Graduation Rate by Economic Development (1998-2012)



Based on the possible explanation for the effect of college graduation rates in developed countries, one would expect developing countries to see a significant correlation between college graduation and homicide. However, that is not the case. The lack of significance may be a product of the population type that graduates in developing nations. The population that attends and graduates college in developing nations tends to be a wealthier portion of the general population (cite). Wealthier populations, on average, also commit fewer violent crimes (cite). Therefore, the population that is graduating in developing countries is not likely to have a significant effect on the homicide rate because they are less likely to be the offender.

The impact of GDP per capita is a bit unexpected in the sense that GDP per capita should also have larger returns in developing countries because they start out at a lower GDP per capita

level compared to developed countries. However, the results suggest GDP per capita has no significant effect in developing countries. A possible explanation for the observed results is that the GDP of a developing nation is likely put to use for other development purposes like infrastructure and export production rather than corrections. Thus, GDP per capita would not have a huge impact on crime reduction – perhaps until the country reaches a threshold of development where the money could be used for other purposes. In developed countries contrary to developing countries, GDP per capita can be put toward corrections and policing the state. Therefore, developed countries can distribute their GDP to actively implement policies and programs for crime reduction.

6. Assault[17]

6.1 Effect of College Graduation Rates on Total Assaults

Model 1: College Graduation Rate and Youth Unemployment Rate

$$\textbf{Ln Assault Rate}_{i,t} = \beta_0 + \beta_1(\textbf{College Graduation Rate}) + \beta_2(\textbf{Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

[17] All models in section 6 will feature the log of total assaults as the dependent variable instead of the intentional homicide rate. Since assault data is sparse, the regressions will also have lower observations. Assaults were analyzed to show the impact of college graduation on at least one other common measure of violent crime.

Model 2: Male College Graduation Rate and Male Youth Unemployment Rate

$$\textbf{Ln Assault Rate}_{i,t} = \beta_0 + \beta_1(\textbf{Male College Graduation Rate}) + \beta_2(\textbf{Male Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Model 3: Female College Graduation Rate and Female Youth Unemployment Rate

$$\textbf{Ln Assault Rate}_{i,t} = \beta_0 + \beta_1(\textbf{Female College Graduation Rate}) + \beta_2(\textbf{Female Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Table 8: College Graduation Rate and Log of Total Assault

	Model 1		Model 2		Model 3	
College Graduation Rate	-0.0138***	(0.00379)				
Youth Unemployment Rate	-0.0125	(0.00824)				
Male College Graduation Rate			-0.0146**	(0.00458)		
Male Youth Unemployment Rate			-0.0104	(0.00775)		
Female College Graduation Rate					-0.0114***	(0.00313)
Female Youth Unemployment Rate					-0.0138	(0.00800)
Population Density	-0.00220	(0.00363)	-0.00193	(0.00362)	-0.00204	(0.00364)
Log of Total Population	0.549	(1.926)	0.268	(2.003)	0.415	(1.893)
Log of GDP per Capita	0.347	(0.403)	0.438	(0.410)	0.503	(0.380)
Polity 2	0.0171	(0.0151)	0.0205	(0.0193)	0.0203	(0.0194)
N	434		416		416	

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

To test previous theories on a wider range of violent crime, an analysis was done on assault rates as a measure of violent crime. The analysis was divided into three different models,

as shown above. The first model used overall college graduation and youth unemployment ratios while the second and third models stratified the ratios by sex.

Each model consistently shows a significant, negative association between college graduation rates and assault rates. A 1% increase in the college graduation rate, whether measured for males or females, is correlated with an approximate 2.23% decrease in the rate of assaults. Though the difference is small – approximately 0.1 percentage points – increases in male college graduation rates do correspond to a larger assault reduction than increases in female college graduation rates. The suggestion is that sex can influence the effects of educational attainment in relation to crime.

Youth unemployment was also insignificant across the models. Though statistically insignificant, youth unemployment displays a negative coefficient in relation to assaults as it did throughout the analyses for intentional homicides. As stated earlier, this is counterintuitive with the idea that higher unemployment rates increase crime regardless of the type of crime.

6.2 Effect of College Graduation Rates on Total Assaults By Level of Development

Developing Countries

<u>Model 1:</u> College Graduation Rate and Youth Unemployment Rate

$$\textbf{Ln Assault Rate}_{i,t} = \beta_0 + \beta_1(\textbf{College Graduation Rate}) + \beta_2(\textbf{Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Model 2: Male College Graduation Rate and Male Youth Unemployment Rate

$$\textbf{Ln Assault Rate}_{i,t} = \beta_0 + \beta_1(\textbf{Male College Graduation Rate}) + \beta_2(\textbf{Male Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Model 3: Female College Graduation Rate and Female Youth Unemployment Rate

$$\textbf{Ln Assault Rate}_{i,t} = \beta_0 + \beta_1(\textbf{Female College Graduation Rate}) + \beta_2(\textbf{Female Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Table 9. College Graduation Rate and Log of Total Assaults by Economic Development (Developing Countries)

	Model 1		Model 2		Model 3	
College Graduation Rate	-0.0242**	(0.00887)				
Youth Unemployment Rate	-0.00584	(0.00596)				
Male College Graduation Rate			-0.0277**	(0.00994)		
Male Youth Unemployment Rate			-0.00178	(0.00488)		
Female College Graduation Rate					-0.0171*	(0.00673)
Female Youth Unemployment Rate					-0.00610	(0.00766)
Population Density	-0.0717	(0.0441)	-0.0709	(0.0437)	-0.0653	(0.0415)
Log of Total Population	5.224	(3.513)	4.330	(3.553)	3.881	(3.489)
Log of GDP per Capita	0.828	(0.468)	1.082*	(0.431)	1.074*	(0.422)
Polity 2	0.0137	(0.0111)	0.0177	(0.0148)	0.0177	(0.0165)
N	148		138		138	

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Though the Table 8 showed that college graduation rates correlate significantly with assault reduction, the above analysis goes further to test the influence of economic development

on that finding. The same models run in section 6.1 were run in this section but only on developing countries.

The results for assault rates are starkly different from those of intentional homicide rates. In the case of assaults, college graduation rates do significantly correlate with their reduction. A 1% increase in the college graduation rate, regardless of sex, is associated with an estimated 2.9% decrease in the assault rate. College graduation rates instead had no significant impact on homicide rates. These results are consistent with those found in section 6.1 that showed a negative correlation between college graduation and assaults across the entire spectrum of countries in this study.

The crime reducing association between college graduation and assaults again seems to be influenced by the sex of the graduates. For developing countries, a 1% increase in the male college graduation rate corresponds to a 0.48% higher decrease in the assault rate as compared to a 1% increase in the female college graduation rate. The constant difference between the graduation rates of the sexes may be explained by the stated assumption that young males are more likely to commit crime than females.

Developed Countries

Model 4: College Graduation Ratio and Youth Unemployment Rate

$$\textbf{Ln Assault Rate}_{i,t} = \beta_0 + \beta_1(\textbf{College Graduation Ratio}) + \beta_2(\textbf{Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Model 5: Male College Graduation Ratio and Male Youth Unemployment Rate

$$\textbf{Ln Assault Rate}_{i,t} = \beta_0 + \beta_1(\textbf{Male College Graduation Ratio}) + \beta_2(\textbf{Male Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Model 6: Female College Graduation Ratio and Female Youth Unemployment Rate

$$\textbf{Ln Assault Rate}_{i,t} = \beta_0 + \beta_1(\textbf{Female College Graduation Ratio}) + \beta_2(\textbf{Female Youth Unemployment Rate}) + \beta_3(\textbf{Population Density}) + \beta_4(\ln \textbf{Total Population}) + \beta_5(\ln \textbf{GDP per Capita}) + \beta_6(\textbf{Polity Score}) + \varepsilon_{i,t}$$

Table 10: College Graduation Rate and Log of Total Assaults by Economic Development (Developing Countries)

	Model 4		Model 5		Model 6	
College Graduation Rate	-0.00526	(0.00272)				
Youth Unemployment Rate	-0.0188	(0.00974)				
Male College Graduation Rate			-0.00393	(0.00516)		
Male Youth Unemployment Rate			-0.0160	(0.00879)		
Female College Graduation Rate					-0.00491*	(0.00183)
Female Youth Unemployment Rate					-0.0218*	(0.0106)
Population Density	0.000711	(0.00287)	0.000843	(0.00287)	0.000505	(0.00291)
Log of Total Population	-1.132	(2.489)	-1.273	(2.557)	-1.068	(2.444)
Log GDP per Capita	-0.895	(0.636)	-0.911	(0.705)	-0.886	(0.632)
Polity 2	-0.0125	(0.0298)	-0.0403	(0.0593)	-0.0275	(0.0334)
N	286		278		278	

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The above analysis was conducted using the same models used on developing countries above, but instead the models were applied only to the set of developed economies in the dataset.

The results show that contrary to developing countries, developed countries do not see a significant correlation between college graduation rates and assaults. College graduation rates also do not become significant when the data is stratified by sex except in the case of female graduates.

The analysis in this section suggests that college graduation rates exhibit a larger negative, more significant impact on the assault rate in developing countries. Graduation rates seem to hold no significance on assault rates in developed countries. The difference between the two sets of countries is likely due to their distinct college graduation trends. Developed countries already feature high college graduation rates as compared to developing countries. So, more college graduates are expected to have diminishing returns as more and more of the college age population graduates yearly. Thus, an increasing graduation rate will see more influential results in developing countries where an increase holds more value.

Though college graduation rates have a significant correlation with assaults in developing countries, the same cannot be said for the correlation between graduation rates and homicides rates. Earlier results showed that the significance of college graduation rates is lost when observing homicide in both developing and developed countries. The question then becomes why college graduation rates are significantly associated with assault reductions in developing countries but the same cannot be said for their effects on homicide rates in developing countries.

A possible explanation is the issue of underreporting. As stated by Fajnzylber, Lederman, and Loayza (2002), assault rates are known to suffer from underreporting while intentional homicides are one of the least effected measures. Figure 3 shows that developed and developing economies do not differ greatly in the average rate of assault. In some instances, developing countries are even shown to have fewer assaults than developed countries. The claim that

developing countries suffer from fewer assaults is generally unlikely and thus reflects possible biases in the assault data. Contrary to assault rates, intentional homicide rates, as shown in Figure 4 are more credibly depicted as higher in developing nations as compared to developed nations.

Figure 3. Total Assaults (Logged) by Economic Development (2003-2012)

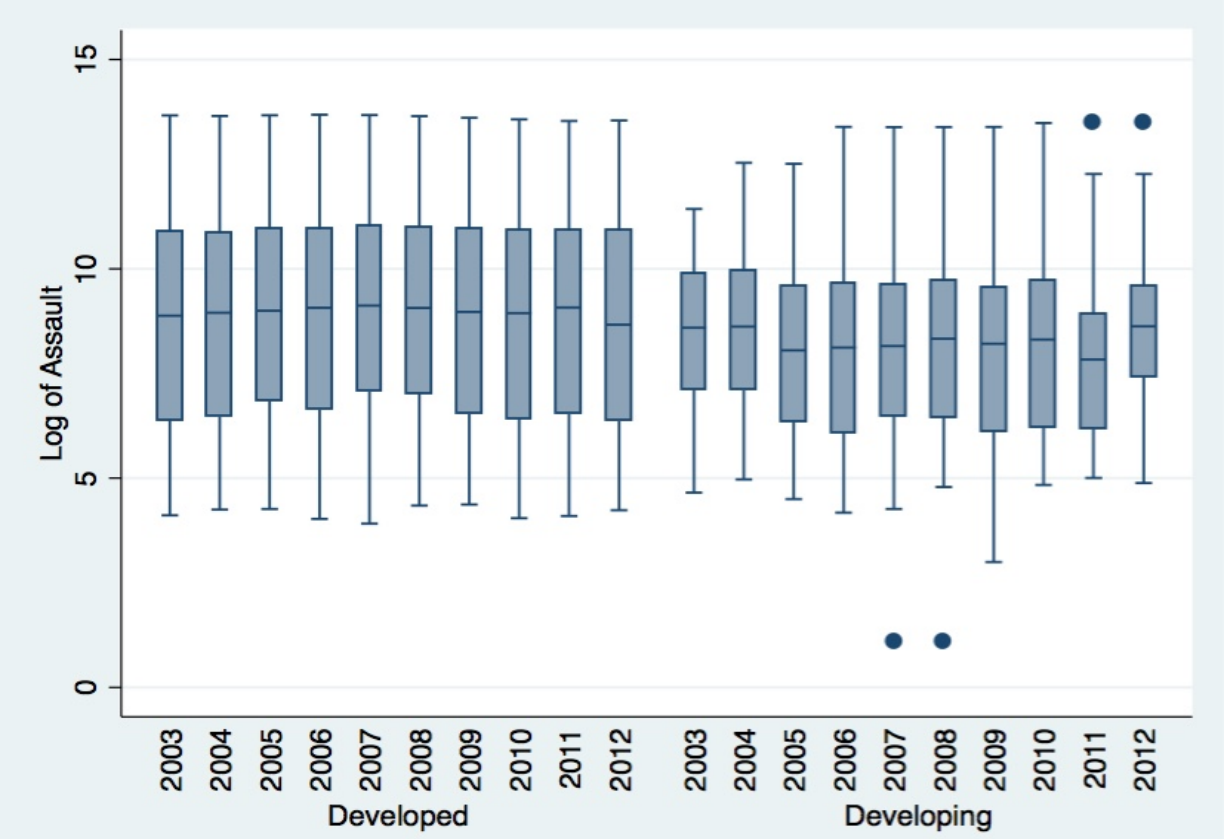
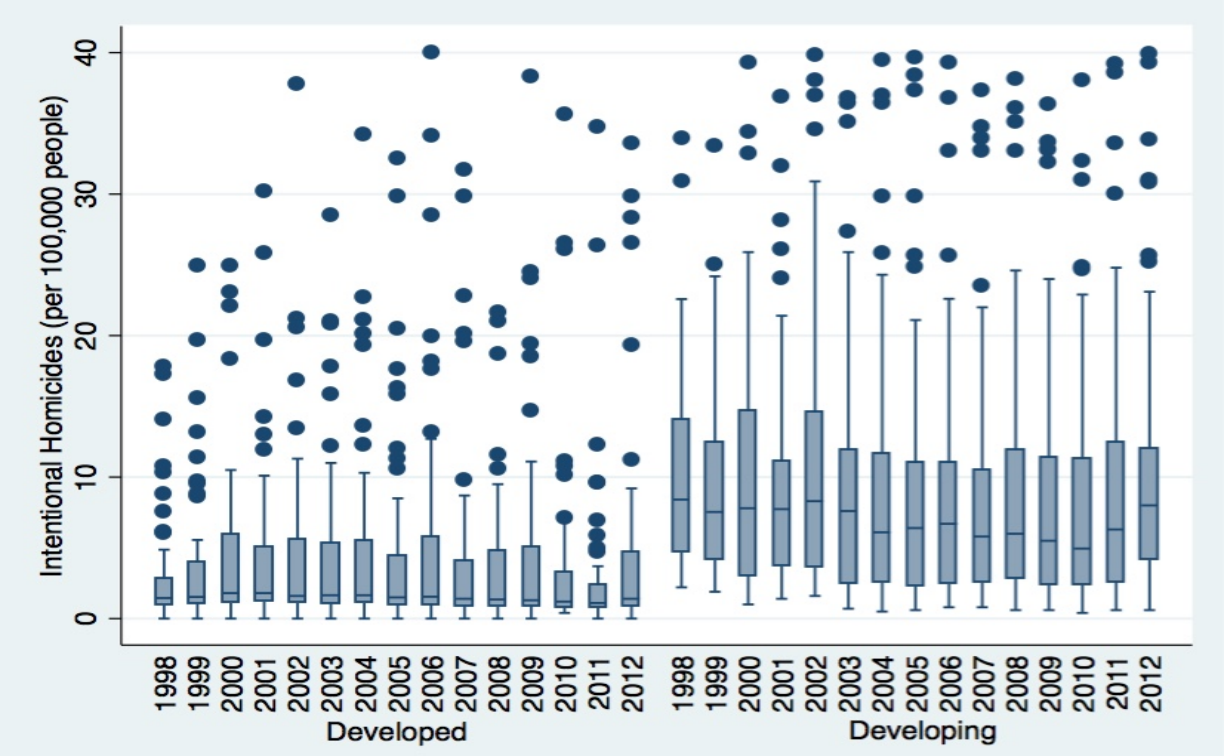


Figure 4. Intentional Homicide Rate by Economic Development (1998-2012)



7. Exploring The Effects of Youth Unemployment

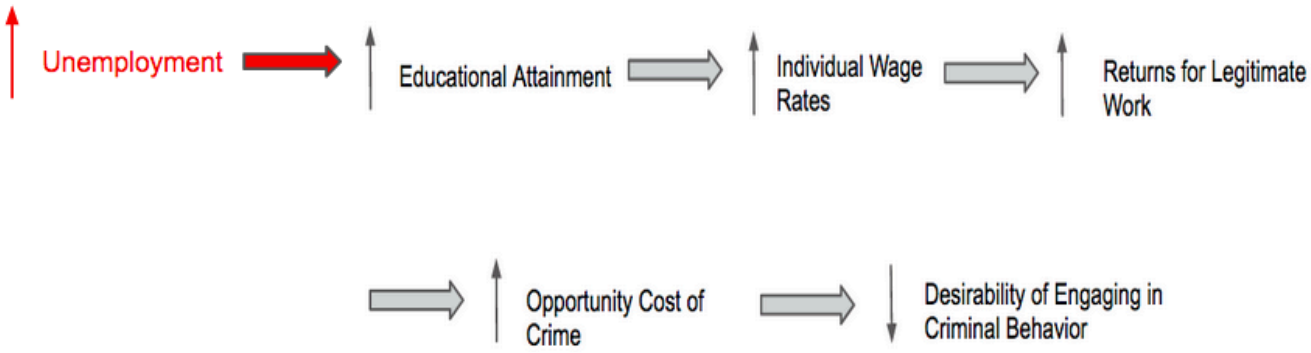
As has been noted earlier in this study, youth unemployment has consistently resulted in negative coefficients. In other words, the homicide rate decreases with increasing youth unemployment. The coefficients have been striking because they go against the commonly held idea that high unemployment leads to crime. So the question then becomes how can increasing the rate of unemployed youth bring about lower homicide rates? What role is unemployment playing? Neither unemployment nor murder are ideal social outcomes yet if taken at face value, the results of this study would signal that decreasing one could not occur without increasing the other.

I propose that the explanation of the effects of youth unemployment lies in the connection between youth unemployment and educational attainment. To cope with rises in unemployment,

many people may choose to obtain higher levels of education – usually bachelors degrees or advanced degrees (Riddell and Song). The logic behind the choice is that higher degrees will open them to other employment opportunities or at least make them more competitive in the job market. For youth in particular, high youth unemployment can serve as a pull factor making higher education an attractive next step in their lives. It is also easier for a younger individual to choose to go to college in comparison to an older individual that has spent a longer time outside of an academic environment and already has an established career. Therefore, rises in youth unemployment especially can lead to higher college enrollment rates, increasing the potential for higher college graduation rates.

If the above theory is true, it seems the initial theory of this study should be updated to include the unemployment variable. Given the theoretical interaction between youth unemployment and educational attainment, unemployment may be initiating the theory as modeled in Figure 5.

Figure 5. Updated Crime Reduction Theory
Income is shown as the mechanism through which educational attainment decreases crime. Unemployment is added as the initial trigger in the theory.



Earlier studies on crime and unemployment have found, as has been found here, that increases in unemployment can decrease crime. However, studies have suggested that while unemployment in the short term may decrease crime, prolonged unemployment complies with the idea of unemployment increasing crime rates (Malby, Steven, et al., 2012). The theory appears promising if one considers the logic that longer periods of unemployment can push people to extremes in the search for alternative means of income. Thus, it could be the case that there is a threshold at which youth unemployment begins to increase the crime rate rather than decrease it. Further research must be done to test that theory.

8. Conclusion

Ex post crime control efforts are not consistently effective. Even if short-term benefits are produced, the long-term sees diminishing returns. The United States, the nation with the largest, most extreme incarceration rates is an example of the results of pouring funds and attention into ex post crime correction. The Brennan Center for Justice (2015), in a rigorous report, has provided support for the argument that mass incarceration does not reduce crime in the U.S. Instead, mass incarceration demands and receives mass sums of public funds with little to no benefit.

The research presented in this study adds to the literature in support of ex ante crime control that can contribute both social and economic benefits instead of diminishing returns. As per the statistical analyses, increases in the educational level of populations are associated with significant decreases in the murder rate – even a 5% increase in the college graduation rate correlates to a significant, 16.5% decrease in the homicide rate. The influence of higher

education levels, however, appears to be dependent on the economic context in which it functions (whether the country is developed or developing and wealthy or not).

One particularly influential economic factor that may be affecting the impact of college graduation rates on crime is the youth unemployment rate. This study has found a statistically significant, negative relationship between youth unemployment rates and homicide rates. The finding echoes similar results from other projects that speak to the short-term crime reducing correlation of youth unemployment. After an analysis of the results of this study, I suggest that youth unemployment rates may be indirectly influencing lower crime rates by pushing the youth population toward higher education in hopes of better employment prospects. The idea of prolonged gratification[18] has been applied previously by (Groot and van den Brink, 2010) to imply a psychological explanation for the crime reducing association of education. The relationship between unemployment and educational attainment, then, has the possibility of being driven by that concept. Further research both in political science and psychology should be done to investigate the influence of unemployment on crime.

The results and analyses found in this text function to support previous crime and education literature that argue that education could produce crime reductions. This study takes those theories and applies them on a global scale to add support for education's wider crime reducing potential. Though much more work needs to be done to sort out the intricacies in the relationship between crime, education, and youth unemployment, the results have shown that further research can be fruitful. Violent crimes such as homicide directly endanger the lives of

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[18] Prolonged gratification here means lower time preference. Groot and van den Brink (2010) describe a lower time preference as follows: "An alternative explanation is that education contributes to a lower time preference (Becker, 1996), i.e. schooling makes that individuals postpone the direct satisfaction of needs. Becker and Mulligan (1994) argue that education leads to a lower time preference for consumption in the present and a higher time preference for consumption in the future."

citizens across the globe. Governments have the ability to minimize that threat through effective, targeted policies and legislation. The research presented in this paper can be used by government officials to both inform the programs they implement for crime control and assist them in crafting their budgets. At the very least, the results presented here can open up more extensive dialogue on education as a constructive, alternative form of crime control.

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Appendix A. Data Description

AI. *Dependent Variables*

Dependent Variable	Years	Source	Measurement
Intentional Homicide Rate	1998-2012	World Bank	Intentional homicides per 100,000 people; The killings included in the homicide rate are those committed by individuals or small groups. It excludes those intentional killings of armed conflict conducted by "cohesive groups of up to several hundred members."
Log of Total Assault	2003-2012	United Nations Office on Drugs and Crime	Measured at the national level; Number of police-recorded offences (total count); Total count logged for this study

AII. *Independent Variables*

Independent Variable	Years	Source	Measurement
College Graduation Ratio	1998-2012	World Bank Education Statistics	Total number of graduates in tertiary ISCED 5A programmes (first degree) expressed as a percentage of the total population of the age where they theoretically finish the most common first degree programme in

			the given country.
Development	1998-2012	World Bank Country and Lending Groups	Dummy variable constructed from World Bank country income group classifications*; Developed = 0 for high-income economies and Developing = 1 for all other economies; The income classifications were based on 2013 gross national income (GNI) per capita which the World Bank calculated using the World Bank Atlas method. The following are the income limits of each classified economy: low-income economies are those with a GNI per capita of $1,045 or less, lower middle-income have a GNI per capita between $1,046 and $4,125, upper middle-income economies are between $4,126 and $12,746, and high-income economies have a GNI per capita of $12,746 or greater.
Youth Unemployment Rate	1998-2012	World Bank Development Indicators	Share of the labor force ages 15-24 without work but available for and seeking employment; Calculated as the percentage of total labor force ages 15-24
Male Youth Unemployment Rate	1998-2012	World Bank Development	Share of the male labor force ages 15-24

		Indicators	without work but available for and seeking employment; Calculated as the percentage of total male labor force ages 15-24
Female Youth Unemployment Rate	1998-2012	World Bank Development Indicators	Share of the female labor force ages 15-24 without work but available for and seeking employment; Calculated as the percentage of total female labor force ages 15-24

AIII. *Control Variables*

Control Variable	**Years**	**Source**	**Measurement**
Population Density	1998-2012	World Bank Development Indicators	Midyear population divided by land area in square kilometers; Population is based on the de facto definition of population, which counts all residents
Log of Total Population	1998-2012	World Bank	Log of the total population
Log of GDP per Capita	1998-2012	World Bank	Gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making

			deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2005 U.S. dollars; GDP per capita was logged for this study
Polity Score	1998-2012	Polity IV	Measure of the level of democratization in a given country year; Polity 2 is used in this study; -10 to 10 scale with -10 being a pure autocracy and 10 being a pure democracy